The bank lending channel: an empirical assessment of measures to stimulate bank lending in the European Union

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DECLARATION

I hereby declare that this thesis has not been, and will not be, submitted in whole or in part to another University for the award of any other degree.

Signature:…….....

UNIVERSITY OF SUSSEX

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Abstract

This thesis first examines the role of banks in the transmission mechanism of monetary policy by focusing on the eight European new member States of Central and Eastern Europe over the 2004-2013 period. We specifically investigate the influence of monetary policy changes on bank lending activity and if this potential influence is contingent on bank characteristics, such as banks' size, capital, liquidity, risk factor and market power. Moreover, we focus on the prospective role of banks in the monetary policy transmission mechanism in order to reveal any clear trends in banks' lending behaviour during the 2008-2011 financial crisis.

Secondly, we investigate the impact of a protracted period of low monetary policy rates on loosening of banks' credit standards regarding enterprises, households and consumer loans through concentrating on the nine Eurozone countries involved since the initiation of the Euro area Bank Lending Survey in the three distinct time frames of pre- (2002Q4-2008Q3), mid- (2008Q4-2010Q4) and post- (2011Q1-2014:Q4) financial crisis. Furthermore, we test the fundamental concept of the risk taking channel by examining excessive risk-taking behaviour by banks in stressed vs. non-stressed countries of the Eurozone. In an additional analysis, the efficacy of the European Central Bank's 3 year Long-Term Refinancing Operations is evaluated in great depth in order to determine

whether banks' credit standards have been softened and the degree to which demand for loans has increased.

Thirdly, we explore the financing structure of bank lending constrained Small and Medium Sized Enterprises in the eleven Eurozone countries by utilising firm-level data over the period of 2009 to 2014. We estimate if bank lending constrained firms demonstrate relatively more usage or requests for alternative financing. Additionally, a comprehensive investigation is presented by unveiling the impact and determinants of various financing constraints including credit lines, bank loans, trade credit and other lending on Eurozone firms. Furthermore, the notion of discouraged borrowers originally formulated by Kon and Storey (2003) is empirically evaluated.

Finally, we present the conclusion of our research by further outlining its limitations and prospective scope for future studies.

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List of abbreviations

BHCs	Bank Holding Companies
BLC	Bank Lending Channel
BLS	Bank Lending Survey
CDs	Certificates of Deposits
CEE	Central and Eastern Europe
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECB	European Central Bank
EMU	Economic and Monetary Union
EONIA	Euro OverNight Index Average
EU	European Union
FLS	Funding for Lending Scheme
GFC	Global Financial Crisis
GLS	Generalized Least Squares
GMM	Generalized Method of Moments
IBCA	International Bank Credit Analysis Ltd
IMF	International Monetary Fund
IO	Industrial Organisation
LLPs	Loan Loss Provisions
LTRO	Long-Term Refinancing Operation
LTV	Loan to Value
M&A	Mergers and Acquisitions
MC	Marginal Cost
MTM	Monetary Transmission Mechanism
NFCs	Non-Financial Corporations
NPLs	Non-Performing Loans
ROA	Return on Assets
SAFE	Survey on the Access to Finance of Enterprises
SDROA	Standard Deviation of Returns on Assets
SFLGS	Small Firms Loan Guarantee Scheme
SMEs	Small and Medium Sized Enterprises
SOSLP	Senior Loan Officer Opinion Survey on Bank Lending Practices
SSBF	Survey of Small Business Finances
TC	Total Cost
TLTRO	Targeted LTRO
U.S.	The United States of America
UK	The United Kingdom
WBES	World Bank Enterprise Survey
ZLB	Zero Lower Bound

Chapter 1: Introduction

This thesis investigates the Bank Lending Channel (BLC) of Monetary Transmission Mechanism (MTM) by focusing on the eight European new member States of Central and Eastern Europe (CEE) over the 2004-2013 period. Moreover, we examine the effect of a protracted period of low monetary policy rates on loosening of banks' credit standards concerning enterprises, households and consumer loans by using quarterly data from the euro area Bank Lending Survey (BLS) from 2002 to 2014. Furthermore, utilising the euro area firm-level data, we determine whether bank lending constrained Small and Medium Sized Enterprises (SMEs) demonstrate relatively more usage or requests for alternative financing; additionally, we conduct a comprehensive analysis by revealing the impact and determinants associated with a broad range of financing constraints by further expanding upon the notion of discouraged borrowers over the 2009-2014 period. This introductory section concisely underscores the value of investigating the essential roles of banks in the transmission mechanism of monetary policy in the newly accessed European Union (EU) States; the significance of examining the ensuing protracted periods of record low real interest rates prevalent in the euro area in light of the Global Financial Crisis (GFC) of recent times; and finally, it stresses the importance of financing for SMEs, given that they are commonly referred to as the backbone of the EU economy.

The 2007-8 GFC has clearly underlined the significance of stability of the banking sector, which supplies credit to the real economy. Many studies, such as Gambacorta and Marques-Ibanez (2011), suggest that the GFC served to show that the majority of macroeconomic literature did not appropriately consider financial intermediaries as a possible source of frictions in the MTM.

In the wake of the 2007-09 financial crisis, there has been a renewed interest among monetary authorities and academics to investigate the role of banks in the MTM,

particularly the BLC which considers the potential consequences that changes in monetary policy can have on the issuing of loans by depository institutions. Prior to the GFC, implementing monetary policy was a matter of controlling the short-term interest rate. Following the GFC, the capacity of the main central banks to effect monetary policy waned and, accordingly, short-term rates approached the Zero Lower Bound (ZLB) (Salachas *et al.,* 2017). Several studies have endeavoured to determine the impact of monetary policy on the credit supply. One of the more challenging aspects is differentiating between potential supply and demand effects, which is especially challenging when analysing aggregated data. As a result, the literature has generally chosen to utilise disaggregated data (Leroy, 2014). The empirical literature stressed three main bank characteristics or parameters of balance sheet strength which may influence the reaction of bank loans to changes in monetary policy, which include: bank size, liquidity and capitalisation (Kashyap and Stein, 1995, 2000; Kishan and Opiela, 2000, 2006; Peek and Rosengren, 1995; Ehrmann *et al*., 2003; Gambacorta, 2005; Matousek and Sarantis, 2009; Altunbas *et al.*, 2010; among others). In summary the research indicates that smaller, illiquid or poorly capitalised banks reduced lending as a result of a tightening monetary policy. According to Akinci *et al*. (2013), a novel area of research has surfaced, given that several empirical studies introduce a new series of questions that address the manner in which the BLC could be impacted by risk factors and bank consolidation (Altunbas *et al.*, 2010; Gambacorta and Marques-Ibanez, 2011; Kishan and Opiela, 2012; Olivero *et al.*, 2011a, b; Amidu and Wolfe, 2013; Fungáčová *et al.,* 2014; Leroy. 2014; amongst others).

From the early 1990s, the CEE nations have undergone major economic changes. Specifically, these countries transitioned from a centrally-planned to a free-market structured economy (Koutsomanoli-Filippaki *et al.*, 2009a). Furthermore, a series of

changes aimed at the banking supervision structure were implemented according to the rules of the EU regulatory system (Koutsomanoli-Filippaki *et al.*, 2009a; 2009b). On a related note Allen *et al.* (2017) imply that a major issue was the establishment of a stable and efficient banking system as a requirement for consistent economic growth; yet, it was evident from an early stage that this would not be easily accomplished. In some instances, post-transition recessions resulted in bad loans and insufficient "*capital positions, systematic banking crises, and an urgent need to both recapitalize and restructure banks*". Evaluating the BLC in the CEE nations is important because their economic systems have reflected substantial information asymmetry and ineffective legal frameworks with inadequate sanction instruments when finalising contracts (Matousek and Sarantis, 2009). These issues create a situation in which the banking sector advances more quickly than the capital market. Moreover, since these States aspire to improve their EU-integration and would like to eventually join the Economic and Monetary Union (EMU), it is crucial to investigate the mechanism of monetary policy transmission in these nations. However, there is little evidence in the current available literature regarding the BLC in the CEEs, and to a great extent the research is limited to a decade prior to their accession.

The GFC has exerted a negative effect on bank lending in the major developed economies and the euro area with significant levels of heterogeneity seen in various nations (Ciccarelli *et al*., 2013; De Santis and Surico, 2013; Öztürk and Mrkaic, 2014).[1] Similarly, a study by Ferrando *et al*. (2015) stresses that the euro area sovereign debt crisis, which occurred in 2010, substantially impaired financial markets and real economic activity in the euro area, which were both still affected by the GFC of 2007-09.

[1] The banking sector is of immense significance for the EU Member States since most of these nations have financial systems that are bank-based instead of market-based (Demirgüç-Kunt and Maksimovic, 2002).

Borrowing costs especially in the Eurozone stressed countries became high enough to impact their capacity to repay the debts, banks tightened credit standards in response, and economic confidence reached a historical low point. Furthermore, inside this region, capital to the corporate sector is mainly issued by banks, which accounts for approximately 80% (Allen *et al.*, 2004). Accordingly, this negatively affects banks' health, in terms of the cost of funds and balance sheets, and their ability to approve loans or credit lines has seen a reduction. Yet, what factors were responsible for the GFC? Empirical research describes the origin of the financial turmoil as stemming from an immoderate relaxation of lending standards as a consequence of excessively low levels of short-term and long-term policies established in the central banks, a simultaneous broad utilisation of financial innovation leading to elevated securitisation behaviour and weak supervision standards, particularly for bank capital (Taylor, 2009; Allen and Carletti, 2010; Acharya *et al*., 2010; Maddaloni and Peydro, 2011; Forbes, 2015; among others). Moreover, in order to improve liquidity levels within the euro area banks, the European Central Bank (ECB) implemented two Long-Term Refinancing Operations (LTROs) in December 2011 and February 2012 in which €1 trillion of cheap loans were injected into the euro area banking system.

In light of the GFC and the ensuing protracted periods of record low real interest rates occurring within the developed economies, the divisive issue concerning the propensity of economic entities to take on additional risk during periods of low interest rates has subsequently resurrected (Rajan, 2006; Diamond and Rajan, 2006; Adrian and Shin, 2010; Borio and Zhu, 2012; Jimenez *et al*., 2014; Ioannidou *et al.*, 2015, Bruno and Shin, 2015; Halvorsen and Jacobsen, 2016; among others). This interest has fostered the notion of another element of the MTM, the risk-taking channel (Adrian and Shin, 2010; Borio and Zhu, 2012). Accordingly, Borio and Gambacorta (2017) suggest a minimum of two

possibilities through which this channel could function. The first theory states that low returns on investments, eg. government (risk-free) securities, could motivate banks, asset managers etc. to assume additional risk for contractual or institutional purposes. Alternatively, low interest rates impact valuations, incomes and cash flows, which may then influence banks' perceptions of risk.

In the context of the GFC, lending to SMEs became the primary topic of consideration for policymakers worldwide, since they are normally known as the backbone of the EU economy. They account for 99.8% of all enterprises, 57.4% of value added, and 66.8 % of employment in Europe (Muller *et al*., 2016). However, several countries have experienced substantial reductions in bank debt and equity capital movement in and out of SMEs, which is known to adversely affect firm performance (Freel *et al*., 2012; Cowling *et al.*, 2012; Cowling *et al.,* 2015). As a result, it is a worrying possibility that this funding gap could be impairing firm growth and economic recovery (Fraser *et al.*, 2015). The empirical data implying that considering their substantial dependency on bank financing, SMEs tend to experience credit constraints if banks modify their loan portfolios as a result of adverse shocks impacting their balance sheets (Ferrando *et al*., 2015; Thomadakis, 2015; among others). One perspective states that an insufficient supply of debt finance exists for the SME market (Stiglitz and Weiss, 1981), while the alternate view asserts that the problem is overinvestment exceeding levels deemed socially efficient (De Meza and Webb, 1987).

Here it is important to recognise that the 2007-8 credit crunch resulted in both more enterprises facing rejection for external financing and more borrowers who did not apply for bank loans due to possible rejection fear, particularly with respect to the Eurozone periphery countries. A study by Cowling *et al*. (2016) affirms that an issue topic which merits more study is the group of SMEs which present as inviting investment

opportunities, yet are discouraged from sourcing external financing as they fear rejection; these are "*discouraged borrowers"*, a concept which is originally defined by Kon and Storey (2003) *as "a good firm, requiring finance that chooses not to apply to the bank because it feels its application will be rejected".* Prior research concerning the prevalence of borrowers in the US and the UK has demonstrated that discouraged borrowers there are twice as common as denied borrowers (Levenson and Willard, 2000; Freel *et al*., 2012).

This thesis comprises five chapters. The next chapter, Chapter 2, explores the BLC of MTM through concentrating on the eight European new Member States that joined the EU in 2004 following the agreement by the Treaty of Accession 2003 in Athens. Using disaggregated data on banks from IBCA-Bankscope for the 2004-2013 period, we test whether the BLC is shaped by traditional bank characteristics such as bank size, liquidity, capitalisation, and by risk factors; analysing the latter is of particular importance given that risk factors allow a more rigorous analysis of the GFC (Altunbas *et al.*, 2010; Gambacorta and Marques-Ibanez, 2011; Kishan and Opiela, 2012). In line with recent literature, we include bank market power as an additional characteristic (Amidu and Wolfe, 2013; Fungáčová *et al*., 2014; Leroy, 2014; among others).[2] Here a broad selection of interaction terms between the aforementioned five bank characteristics and monetary policy is considered in order to determine if they influence the transmission of monetary policy in the sample examined. Bank competition is estimated here via the Lerner index, a bank-specific gauge of competition, whereas monetary policy is proxied by the short term interest rate. Finally, in a further analysis we focus on the prospective role of banks

[2] The level of bank competition may impact the effectiveness of monetary policy by facilitating or impairing the transmission of monetary policy decisions (Beck *et al*., 2013; Fungáčová *et al*., 2014; Leroy, 2014; among others).

in MTM with the purpose of discovering trends in banks' lending behaviour during the 2008-2011 financial crisis. A study by Matousek and Sarantis (2009) argues that the CEE States had variation in their "*monetary, fiscal and transition policies"* and discourage the notion of pooling the data for all countries as this would generate biased estimates concerning the transmission mechanism of monetary policy. Likewise, Favero *et al.* (1999) imply that when utilising cross-sectional data on banks sourced from various nations, interest rates changes would act as a country dummy. As a result, we choose to unveil the modifications to the BLC in the CEE States by estimating the model individually for each State. Considering that several of the nations are home to a relatively small number of total banks, we establish the existence of the BLC within Baltic States by pooling data sampled from Estonia, Latvia and Lithuania with the purpose of addressing this issue; yet, this issue should not be a large one because these States have experienced comparable monetary and transition regimes.

The following chapter, Chapter 3, investigates the euro area BLS through focusing on the nine euro area countries involved since the beginning of the survey from 2002Q4 to 2014Q4. Hence, the Eurozone represents a novel institutional environment with a common monetary policy. This appears to be an adequate period because it includes a whole cycle of monetary policy which is defined as the time it takes for a monetary contraction and monetary easing to occur. Firstly, we evaluate whether the protracted periods of low monetary conditions prior to the financial crisis caused an increase in softening of banks' credit standards as applied to approval of loans or credit lines to enterprises, households and consumer credit. Secondly, we examine if the intensity of this connection has been modified as a results of the expansionary monetary policy documented both during and after the GFC. Thirdly, we test the fundamental notion of risk taking channel by examining excessive risk-taking behaviour by banks in stressed vs.

non-stressed countries of the Eurozone for the pre- and post-financial crisis periods; Fourthly, in an additional analysis, the efficacy of the ECB 3 year LTROs is considered in extensive detail with the purpose of discovering if banks' credit standards have been relaxed and determining the degree to which demand for loans has increased considering that a total sum of €1 trillion cheap loans was injected into the EU banking system under these operations.

Chapter 4 evaluates the financing structure of bank lending constrained SMEs in the eleven euro area nations and uses the ECB/EC Survey on the Access to Finance of Enterprises (SAFE) for twelve waves from 2009H1 to 2014H2. For this chapter, we estimate if bank lending constrained SMEs demonstrate relatively more usage or requests for alternative financing, eg. grants or subsidised bank loans, trade credit, informal lending, leasing, hire purchase or factoring, market financing comprised of equity, issued debt securities or subordinated loans, and internal funds. Our measures of credit constraints distinguish between five types of constrained firms which take the following form: a) credit constrained firms, b) credit rationed firms, c) credit rejected firms, d) self-rationed firms and e) discouraged firms. Furthermore, the impact and determinants involved in a wide range of financing constraints such as bank loans, trade credit, other financing and credit line are comprehensively revealed. Additionally, we contribute to the available literature by assessing the concept of discouraged borrowers originally formulated by Kon and Storey (2003) through investigating the key determinants of discouragement using firm-specific characteristics as well as banking and macroeconomic indicators. Finally, we regroup the original sample into two panels so as to unveil the important differences between the periphery vs. core countries of the Eurozone compared with the discoveries garnered from the whole sample and the resulting conclusion.

To conclude, Chapter 5 offers a summary of the contributions of this thesis and presents some ideas and policy implications. Additionally, the limitations of this research and thoughts for future research are addressed.

Chapter 2: The bank lending channel: an empirical analysis of EU accession countries from 2004-2013

2.1 Introduction

During the evolving process of fully integrating each of its member nations, the European Union (EU) commenced its eastern expansion strategy by including nations from Central and Eastern Europe (CEE). The EU officially initiated a changeover process in March 1998 which produced the larger Union by May 1st, 2004. Substantial political and economic transformations have occurred in each of the ten new EU Member States. The CEE nations in particular have transitioned from a centrally-planned to a free-market structured economy (Koutsomanoli-Filippaki *et al.*, 2009a). Moreover, a sequence of amendments directed at the banking supervision structure were established in keeping with the rules of the EU regulatory system (Koutsomanoli-Filippaki *et al.*, 2009a; 2009b). In light of the post-crisis credit crunch, monetary authorities and the academic world have experienced a resurrection of interest in evaluating the role of banks in the Monetary Transmission Mechanism (MTM), especially the Bank Lending Channel (BLC) which assumes that changes in monetary policy alter the supply schedules of bank loans (Bernanke and Gertler, 1995). As stated by Matousek and Sarantis (2009) and Akinci *et al.* (2013), the BLC arises from a combination of a deposit market constraint and a binding lending constraint.

The number of empirical studies that are attempting to investigate the effect of monetary policy shocks on bank lending activity and behaviour via the BLC is rapidly increasing; such papers include Kashyap and Stein (1995; 2000), Peek and Rosengren (1995), Kishan and Opiela (2000; 2006; 2012), Ehrmann *et al.* (2003), Gambacorta (2005), Matousek and Sarantis (2009), Gambacorta and Marques-Ibanez (2011), Akinci *et al.* (2013),

Fungáčová *et al.* (2014; 2016) and Leroy (2014), among others.[3] Yet, having noted a gap in the existing literature, this chapter attempts to add to the current research through concentrating on the effect of monetary policy specifically in the newly accessed EU States.

Our aim in this chapter is to investigate the BLC of MTM by focusing on the eight European new Member States that joined the EU in 2004 following the agreement by the Treaty of Accession 2003 in Athens. The aforementioned objective is consequently evaluated in further detail with reference to these countries: the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia and Slovenia, hereafter EU-8.[4]

It is important to note that the BLC in EU-8 has not been previously tested before, although there have been several empirical studies that examined individual EU nations for its existence. However, Matousek and Sarantis (2009) is the only study that examines the BLC with reference to the panel of 8 CEE countries from 1994-2003. The data is sampled to take into account the decade following the accession, presenting the researcher with a novel benefit to reveal potential alterations regarding the BLC within the EU-8 compared with the seminal study conducted in Matousek and Sarantis (2009) which examines the decade before the accession.[5]

In this chapter the possibility of the BLC being molded by traditional bank characteristics (size, liquidity and capitalisation) as well as by risk factors is investigated; evaluating the

[3] It must be stated here that the empirical studies conducted in the US are more conclusive than studies based in Europe.
[4] We exclude Malta and Cyprus, as there are major differences between their banking sector and the selected countries chosen for this study.
[5] This study utilises an unbalanced panel data set of banks in EU-8 nations spanning the time frame from 2004-2013; this time selection is most appropriate for analysing the BLC since three nations were initiated into the Economic and Monetary Union (EMU) during this period. Following this, the capability of these nations to direct monetary policy has been given to the European Central Bank (ECB).

latter is of particular significance as risk factors permit the development of a more comprehensive analysis of the 2007-8 financial crisis.

Additionally, we consider a wide selection of interaction terms between the previously stated four bank characteristics and monetary policy with the purpose of ascertaining whether they affect the transmission of monetary policy in the sample examined.

Conclusively, this study contributes on the available literature through a specific focus on the prospective role of banks in MTM in order to reveal any clear trends in banks' lending behaviour during the financial turmoil.

When examining the wide scope of available literature concerning the BLC, only a limited minority of the total research has targeted the impacts of bank structures and competition. As a result this chapter further contributes to the available research by determining if a bank possessing greater market power is more capable of protecting its lending activity in light of the changes in the monetary policy stance introduced to newly accessed EU States. In order to accomplish the aforementioned objective, this study follows an analogous contemporary methodology to that applied by Fungáčová *et al.* (2014) and Leroy (2014), which connects bank competition to the BLC of monetary policy.

This study encounters an identification issue with respect to the disentanglement of loan supply from loan demand given that the BLC is only relevant to the bank lending supply. This problem is tackled by utilising the fundamental approach employed by Fungáčová *et al.* (2014), which accepts that all banks experience homogenous loan demand.[6]

[6] Fungáčová *et al.* (2014) rationalise for the problem inherent on looking at actual loans supplied (and thus demanded) at prevailing interest rates borrowing the approach used in Kashyap and Stein (1995, 2000), which is based on the assumption that every bank experiences identical loan demand and also that if bank lending variations are different between different types of banks, this must be a result of the different bank types changing their supplies of credit in dissimilar ways.

Such an assumption can be condemned, particularly as the 2007-8 credit crunch began, which has fostered a novel method used in Jimenez *et al.* (2012) that necessitates loan level data. As a result of the lack of extensive loan level data for the EU-8 countries, implementation of the aforementioned methodology is not possible in this study.

During the course of the investigation, the following is demonstrated: the results based upon panel fixed effects specification do not specify direct correlation between monetary policy and bank loans via the money lending channel. For this reason the theory of a direct correlation is unsubstantiated; nevertheless an indirect influence from the BLC is supported through bank capitalisation. Similar corroborating data concerning the impact of bank capitalisation is reported in Matousek and Sarantis (2009), Gambacorta and Marques-Ibanez (2011), Leroy (2014), and Fungáčová *et al.* (2014).

Moreover, contrary to the conclusions in Matousek and Sarantis (2009) for 8 CEE countries, we find no evidence to support the role of bank size in EU-8 nations. This deduction is in keeping with the literature that investigated the BLC, specifically in the context of banks in Western Europe (Ehrmann *et al*., 2003; Altunbas *et al*., 2010; Gambacorta and Marques-Ibanez, 2011). While no supporting evidence is found in order to establish the existence of the BLC through bank liquidity except in Slovakia, bank risk appears to be a crucial differentiating factor in the reaction of banks to changes in the monetary policy stance within the EU-8 countries, this corroborates the findings documented in Altunbas *et al*. (2010), Gambacorta and Marques-Ibanez (2011), and Leroy (2014), among others. It can be determined that banking competition diminishes the effectiveness of monetary policy on a bank's ability to lend to borrowers. Yet, these finding are in contrast with the results obtained in an examination of the euro area countries by Leory (2014) and Fungáčová *et al.* (2014).

Furthermore, the model used in this study is constructed to consider any distinct movement on banks' lending behaviour for the period of the financial turmoil. The BLC is determined to have declined from 2008-2011, a conclusion derived from the fact that the majority of bank characteristics were ultimately determined to either not be significant or to have surprising negative values; these conclusions can be viewed as a further negation of the assumed function of such characteristics in maintaining bank lending activity and growth over the course of the global credit crisis.

What are the key points that can be garnered from our findings in this chapter? We established that the traditional bank-specific traits commonly utilised in the literature such as size, liquidity and capitalisation are unable to completely encapsulate the functioning of the new magnitudes of the BLC of MTM, especially during the course of the financial crisis. These novel findings contradict the previous seminal results by Matousek and Sarantis (2009) that investigates the BLC with reference to the panel of eight CEE countries from 1994-2003. Additionally, the efficacy of monetary policy has been weakened during the financial crisis owing to a variety of different elements, such as bank aversion to increase lending activity and volume irrespective of the variations in the monetary policy. The important dilemma is whether these changes in the MTM will continue into the foreseeable future or disappear as the GFC diminishes? The findings presented in this study support a scenario in which these modifications can only be looked upon as ever changing and tend to evolve over years. Furthermore, the findings favour the roll-out of regulatory capital requirements and implies that this would not induce a diminishing of bank lending. Bank capital and liquidity exhibited positive and significant impact on bank lending growth over the total sample period. Consequently, it would be paramount that banks adhere to banking regulations created by the Basel Committee. This study calls for a better, widespread data accessibility on the entire banking system,

measurement by tier-1 capital ratio would be particularly beneficial in this regard as building on core capital eases the transmission of monetary policy. Additionally, the shadow banking system should be diligently scrutinised due to the potentially hazardous elements indigenous to this system, reinforcing the notion of having regulatory rules that are a good fit with its complementary financial institution. Moreover, our incisive analysis corroborates that banks in the newly accessed EU States with a high level of market power are less prone to the vicissitudes in monetary policy stance to issue bank loans. Specifically via tightening monetary policy, the monetary authorities are more likely to effectively lower the supply of bank loans within a banking market with reduced competition.

.The rest of this chapter is structured as follows. Section 2.2 offers an in-depth investigation of the developing EU-8 banking system. Section 2.3 presents a review of the literature on the BLC. Section 2.4 explains the data and methodological framework. Section 2.5 discusses the empirical results, while section 2.6 concludes.

2.2 Summary analysis of the financial framework in the recently accessed EU States

The majority of the new EU States experienced financial reforms over the course of their transition on account that their banking sectors share several structural traits (Mamatzakis *et al*., 2008). These States have also seen increased domestically-sourced credit to the private sector during the sampled period. Yet, in spite of the aforementioned increase, the extent of financial intermediation in this set of countries remained below the average value in the EU. Furthermore, noteworthy efforts to reform were aimed at advancing banking sector-related legislation.

A large-scale report from the International Monetary Fund (IMF) encompassing a quarter of a century's worth of transition within Post-Communist Europe from 1990 to 2014

particularly concentrated on the CEE and Baltic States indicates that the first transition economic downturns coincided with high or hyper-inflation within the majority of nations, since prices migrated to market level while governments turned to "*monetary financing of gaping fiscal deficits*".

During the 1990s, nations sequentially tempered fiscal deficits and inflation, despite having false dawns in a few instances. Contrary to the instability and dissimilarity during the 1990s, growth models from the earlier portion of the 2000s demonstrated robustness without exception. In the background of advantageous worldwide conditions as well as growing confidence with quick convergence in Western Europe, average growth for the area measured 6 percent; here every country grew more than 3% each year, which was more rapid than the majority of nations have reliably managed to do pre- or post-crisis.[7]

Roaf *et al.* (2014) assert that the imbalances accumulated from the "*Great Moderation*" time frame put transition economies at risk. Preliminary along with external shocks seen in the Lehman Brothers' bankruptcy during 2008 and the EU crisis in 2010–2012 exerted tremendous consequences, affecting the CEE most detrimentally within emerging markets areas. The effect continues to echo, exhibited in persistent subpar potential growth, elevated unemployment and vulnerable financial markets.

Table 1 illustrates the fact that the majority of countries saw substantial enhancements in banking reform practices; this has especially been the case since 2004. The lowest value for the ranking index is 1, denoting minimal advancement in changing the socialist banking system and the highest rank is 4 which is characterised by changes which are in keeping with a market economy that is functional.

[7] For a complete summary of the report carried out by the IMF, refer to Roaf *et al.* (2014) as depicted in references.

Table 1: Banking sector indicators[8]

Country	Credit to the private sector		M2/GDP		EBRD banking index	
	2004	2013	2004	2013	2004	2010
Czech Republic	31	58	56	81	3.7	4*
Estonia	61	75	58	68	4	4
Hungary	46	52	49	63	4	3.7
Latvia	51	61	38	43	3.7	3.7
Lithuania	29	46	35	47	3.3	3.7
Poland	28	55	40	60	3.3	3.7
Slovakia	30	45	57	55	3.7	3.7
Slovenia	48	73	53	74	3.3	3.3
EU-8	40.5	58.12	48.2	61.3	–	–

Source: The World Bank, EBRD Transition Report.

Table 1 presents the domestic credit to the private sector (as a percentage of GDP), the M2/GDP ratio and the European Bank for Reconstruction and Development (EBRD) banking reform index. The EBRD banking reform measure offers a classification of advancement for liberalisation and institutional reform of the banking sector.

The rate of interest liberalisation and banking reforms was comparable between the nations. Enhanced banking reform practices are reflected at the financial deepening level. From 2004 to the end of period sampled, the average M2/GDP ratio increased from 48.2% to 61.3%. The same period also saw an increased rate of domestic credit to GDP from 40.5% to 58.12%.

From the perspective of the EU, the new banking union and regulation act compatibly to mould novel prospects in banking. Such advances are predicted to generate beneficial influences, largely in the transition nations, through improving financial stability while decreasing fragmentation. Accordingly, this introduces the option of additional advantages for EU members choosing to become members of the banking union, decreasing compliance costs for cross-border banks as well as issues concerning *"home-*

[8] The EBRD banking index most recent analysis of the Czech Republic is 2007 whereas Credit to private sector in addition to M2/GDP ratio data gathered for the Slovak Republic is limited up to 2008.

host supervision", in spite of the cost of loss of autonomy at the country level (Roaf *et al.,* 2014).

2.2.1 The Fraser Index of Economic Freedom and its constituents

The Fraser Index of Economic Freedom is made up of five elements characterised as: size of government: expenditures, taxes, and enterprises GOV-F_{index}; legal system and property rights LSP-F_{index}; access to sound money SMO-F_{index}; freedom to trade internationally FTI-F_{index}; and regulation of credit, labour, and business REG-F_{index}.

The aforementioned components are weighted to produce a composite index t; this index is measured from 0-10 in order of ascending levels of economic freedom as conducted in Gwartney *et al*. (2014).

The mean scores for the economies of EU-8 nations from 2004-2012 are outlined in Table 2. Whilst examining the regional mean values, the degree of general economic freedom OVR-F_{index} is 7.31, a value which is lower than several of the other components of the economic freedom, for example access to sound money SMO-F_{index} and freedom to trade internationally FTI-F_{index} which yields values of 9.17 and 7.96 respectively.

When analysing the sample taken, the data suggests that reforms corresponding to size of government GOV-F_{index} and legal system and property rights LSP-F_{index} occur less frequently as the regional averages for these indices are calculated at 5.70 and 6.39 respectively. At the domestic level the standout nations with respect to the OVR-F_{index} are Estonia (7.82), Slovak Republic (7.50) and Lithuania (7.48); the aforementioned countries produce a higher score when compared with the regional mean value in the majority of the main components in the overall index of economic freedom (see Table 2).

Table 2: Progress of economic freedom in the EU-8 markets (2004-2012)

Country	GOV-F_{index}	LSP-F_{index}	SMO-F_{index}	FTI-F_{index}	REG-F_{index}	OVR-F_{index}
Czech Republic	4.96	6.19	9.3	7.93	7.39	7.15
Estonia	6.41	7.22	9.25	8.48	7.72	7.82
Hungary	4.95	6.41	9.42	7.96	7.38	7.22
Latvia	5.83	6.55	8.87	8.15	7.41	7.36
Lithuania	6.78	6.46	8.99	7.86	7.32	7.48
Poland	5.49	6.03	9.33	7.39	7.04	7.05
Slovakia	6.44	6.1	9.35	8.15	7.45	7.5
Slovenia	4.71	6.16	8.87	7.75	6.81	6.86
Average EU-8	5.70	6.39	9.17	7.96	7.32	7.31

Notes: figures correspond to average values, ranging from 0–10. Larger values signify a more liberal economic environment. Source: the 2014 version of the Fraser index of economic freedom.

In Table 3 the economic freedom variables over time in EU-8 are illustrated. The time frame examined in this study reveals modest growth for the bulk of components of economic freedom in addition to the OVR-F_{index}. Most remarkably, the LSP-F_{index} shows the highest increase from 6.13 in 2004 to 6.31 in 2012. Yet, it is also worth mentioning that just the FTI-F_{index} undergoes a modest reduction during the time frame sampled (see Table 3).

Table 3: Development of economic freedom over a period in the EU-8 (2004-12)

Year	GOV-F_{index}	LSP-F_{index}	SMO-F_{index}	FTI-F_{index}	REG-F_{index}	OVR-F_{index}
2004	5.71	6.13	9.09	8.28	7.31	7.30
2005	5.69	6.42	9.09	8.01	7.34	7.31
2006	5.68	6.55	9.12	7.99	7.30	7.33
2007	5.84	6.49	9.15	8.03	7.29	7.36
2008	5.77	6.42	9.15	7.97	7.33	7.33
2009	5.46	6.43	9.40	7.91	7.31	7.30
2010	5.50	6.37	9.27	7.88	7.17	7.24
2011	5.76	6.38	9.21	7.80	7.32	7.29
2012	5.88	6.31	9.12	7.77	7.45	7.30
Average EU-8	5.70	6.39	9.18	7.96	7.31	7.31

Notes: Figures correspond to average values, ranging from 0–10. Larger values signify a more liberal economic environment. Source: The 2014 version of the Fraser index of economic freedom.

2.3 Literature review

2.3.1 The credit channel mechanism of monetary policy

It is very challenging to determine the scale, temporal incidence and components involved in the reaction of the economy to significant changes in monetary policy if only the traditional interest-rate (neoclassical cost-of-capital) effects are considered. The credit channel and its endogenous mechanisms can be used in this case to bridge the gap in our understanding of these phenomena (Bernanke and Gertler, 1995).

The term '*credit channel'* can be misleading given that it suggests a distinct alternative to the conventional monetary policy transmission mechanism. Instead, the credit channel is an augmentation to this mechanism rather than a separate channel (Bernanke and Gertler, 1995). Proponents of the channel argue that monetary policy also influences the magnitude of the external finance premium, in addition to its more widely accepted impact on interest rate levels.

As stated by the credit channel theory, the influence of monetary policy on interest rates is intensified through variation within the external finance premium which is defined as the variance in cost between internally available capital and externally acquired capital. External funds can be acquired by borrowing or offering equity and internal funding through holding on to earnings from a given company's cash flow. The value of the external finance premium provides insight into credit market imperfections which influence the dynamic concerning the returns that creditors expect to earn and the amount that prospective borrowers expect to pay. In keeping with the '*credit view'*, alterations in monetary policy that serve to increase or decrease interest rates in the open market will also have a directly correlated effect on the external finance premium. As a result of this extra influence of monetary policy, its effect is enhanced with respect to the cost of borrowing, and real spending and activity (Bernanke and Gertler, 1995).

2.3.2 The two subdivisions of the credit channel

Frexias and Rochet (2008) put forward two possibilities that may clarify the manner in which the policies of the central bank influence the external finance premium within credit markets. The first is the balance sheet channel, which emphasises the potential effect that modifications to the monetary policy can have on a borrower's income statements and balance sheets. The explanation provided by the balance sheet channel is based on the hypothesis that the external finance premium for a borrower is contingent on that borrower's financial status. The BLC is the other possibility which specifically considers the potential consequences that changes in monetary policy can have on the issuing of loans by depository institutions. Apart from its influence on balance sheets for a borrower, the monetary policy can also impact the external financial premium by disrupting the supply of intermediated credit, such as credit provided by commercial banks; this is the essence of the BLC.

Bernanke and Blinder (1988) described a model of the BLC which proposed that when the Fed conducts open market sales that serve to deplete reserves and, consequently, bank deposits; this could restrict the supply of credit through limited access to loanable capital for the banks. Such an outcome would be passed on through the level and composition of bank assets, and is, in addition to the conventional effects of interest-rates and supply of capital, reflected in decreasing bank liabilities. Furthermore, the model is based on the assumption that securities and loans and imperfect alternatives in the collection of investments held by the banks; therefore, the banks would be disinclined to totally accept deposit losses by decreasing securities holdings.

2.3.3 Stylised facts and empirical evidence concerning the BLC

Following the influential conclusions derived from Benanke and Blinder (1988) which discovers the existence of a transmission channel through the credit supply, several studies have endeavoured to differentiate between the various channels involved in the MTM.

A study conducted by Matousek and Sarantis (2009) highlights that during a tight monetary policy, a central bank indirectly forces banks to switch primarily from insured funds and reserves to uninsured and non-reservable sources of capital. Accordingly, adverse-selection problems may occur as a result which could influence a bank's lending position and activity (Stein, 1998).

Market constraints limit the amount of debt that the bank can issue (Van Hoose, 2007). Romer and Romer (1990) stress that, if necessary, banks are capable of self-financing using funding that is independent from deposit sources; therefore, banks are able to offset the effects of monetary policy constriction to their lending activity by simply offering more Certificates of Deposits (CDs). In view on that, the BLC could theoretically be ineffective if banks were allowed to offer unchecked amounts of CDs, or bonds immune to reserve requirements (Gambacorta and Marques-Ibanez, 2011).

Opponents of the BLC theory appear to believe that the weakest aspect of this view is the suggestion that the Fed can influence banks' loan supply plans just by altering the reserves. This point can be directly addressed through thorough analysis of the subgroups present in disaggregated bank data. Considering the intrinsic uncertainties that arise from solely analysing aggregate data, it would be prudent to make use of disaggregated data with the purpose of investigating the lending view and its implications. The lending view posits that tight monetary policy is particularly hard on smaller firms which are heavily

bank-dependent; whereas larger firms are not as vulnerable since they often have sources of external financing that are bank-independent.

The available literature stresses three primary bank attributes which can also be considered gauges of balance sheet strength and that have the potential to influence the reaction of bank lending to a change in monetary policy; these characteristics include: bank size, capitalisation and liquidity. It is prudent to note at this stage the general conclusion that can be deduced using the existing literature as a reference is that the studies appear to support the existence of a BLC in the US which operates via small banks (Kashyap and Stein, 1995), small and poorly capitalised banks (Kishan and Opiela, 2000), or small banks with low liquidity (Kashyap and Stein, 2000).

Indeed the data from the EU Banking system is substantially less convincing than from the US. De Bont (1999) conducts an analysis of six EU nations and determines that a BLC exists in Belgium, Germany and the Netherlands when the short-term interest rate is essentially utilised as a substitute for monetary policy action. However, there is insufficient evidence to support the existence of a BLC in France, Italy or the UK. Altunbas *et al*. (2002) determine that within the EMU systems, banks that experience suboptimal capitalisation demonstrated a tendency to be more responsive to alterations in monetary policy, irrespective of size. Additionally, Ehrmann *et al*. (2003) examine micro and aggregate data, concentrating on the four biggest economies in the Eurozone. The study determines that banks with lower liquidity showed a tendency to adapt a strong reaction to changes in monetary policy than their more liquid counterparts. Gambacorta (2005) analyses quarterly-derived data taken from Italian banks and determines that the BLC operates via poorly capitalised banks with low liquidity. An extensive study by Matousek and Sarantis (2009) aims to determine the role of banks in the MTM and the existence of a BLC in the eight CEE nations; the study concludes that liquidity and size

were the two most relevant bank characteristics that determined a bank's response to the changes in monetary policy.

The BLC assumes that smaller banks are more vulnerable to the issues that arise from information asymmetry when compared with larger banks which are able to provide CDs and other market instruments. Smaller banks are therefore considered to be more sensitive to expansionary and constrictive monetary policy shocks (Kashyap and Stein, 1995 and 2000; Kishan and Opiela, 2000). Poorly-capitalised banks are forced to decrease their loan supply to a greater degree when compared with well-capitalised banks, following a period of tight monetary policy; this ability is a result of the former's limited capacity to access uninsured sources of funding (Peek and Rosengren, 1995; Kishan and Opiela, 2000 and 2006). Liquidity is another important bank characteristic which can be utilised to shield loan portfolios by decreasing their liquid assets. Consequently, banks with lower liquidity are less capable of protecting their loan portfolios (Kashyap and Stein, 2000; Ehrmann *et al*., 2003; Matousek and Sarantis, 2009; Altunbas *et al.*, 2010). These characteristics are considered to be positively correlated with bank loan activity.

2.3.4 Changes to the BLC after the 2007-8 financial crisis

The 2007-08 credit turmoil served to underscore the importance of financial markets' perception of risk with respect to the banks' ability to generate funds. Furthermore, in this regard banks' balance sheets have been vulnerable to credit turmoil in several respects (Altunbas *et al*., 2010). Correspondingly, Gambacorta and Marques-Ibanez (2011) investigate the effect that banking strategy has on the supply of credit and the transmission mechanism of monetary policy within the period of the financial crisis. The study asserts that banks possessing a larger percentage of profitable, yet high-risk, non-interest income sources exercised more frugal lending to borrowers. A similar study by Kishan and Opiela

(2012) investigates the effects of the 2007-8 credit crisis on the BLC and established risk factors involved in the MTM.

Following the failure of the Lehman Brothers investment bank in September 2008, Mullineux (2013) posits that the commencement of the global financial crises produced a greater tightening in bank lending, also known as the '*Credit Crunch'*. This constriction was a result of the understanding that banks should '*deleverage*' by increasing the capital to asset ratios through combining reducing assets and raising new capital.

These conclusions are in keeping with Cohen (2013), a study that analyses a sample of 82 large international banks taken from advanced and emerging economies in order to identify banking lending strategies post-crisis. The study notes that banks which emerged from the crisis with higher capital ratios and increased profitability could increase their lending activity to a greater degree. In order to support long term growth, financial and non-financial institutions should adapt to the low leverage conditions within an economy which primarily funds robust, lucrative projects and avoids untenable booms (Cohen, 2013).

Comparatively, Bech *et al*. (2014) suggest that deleveraging within a standard downturn does not serve to yield any substantial benefits during the recovery that follows. Alternatively, deleveraging under these crisis conditions had a positive, significant correlation to the magnitude of the following recovery. Given that highly leveraged banks are prone to distorted lending decisions, Admati *et al*. (2013) assert that banks with greater capitalisation make comparatively wiser lending choices. Specifically, such banks are less inclined to assume higher risks and will be accordingly less vulnerable to issues concerning '*debt overhang'* which would preclude them from making loans of high value.

In the context of the post financial crisis period, a study by Mullineux (2013) states that banks endure relatively high '*fixed costs'* when lending. As a result, they prefer to make a few larger loans than many smaller loans. With respect to borrowers that require less capital, credit provision, low transactions cost and invoice discounting (i.e. '*factoring*' or lending based on assets) via the Internet could be more suitable. Accordingly, the banking system at large is therefore adjusting to plug credit gaps created by traditional commercial banks. These banks are also dropping business to the capital markets since smaller firms gain are able to access direct debt finance from the bond markets at increasingly affordable rates.

The gaps created and left by traditional commercial banks have fostered a process of disintermediation in which shadow banking and other elements of the financial system can cover these gaps. Admati *et al*. (2013) argue that this is a consequence of higher capital requirements which would serve to shift key activities from the regulated components to the shadow-banking system in which leverage is commonly even greater than the standard banking system. Yet, the majority of highly leveraged institutions within the shadow-banking component were channels and organised investment mediums, as opposed to being separate units, which has been originated and backed by specific financial institutions that comprised the regulated components of the financial system.

Notably, shadow banking technology involves less capital and confers safety through issuing collateral to repo investors and can obtain the collateral on short term notice. Consequently, money derived from shadow-banking is far more likely to run when compared with standard bank money, which qualifies the banking model as more suited for investing in illiquid assets (Stein, 2014).

2.3.5 Monetary policy and bank competition

Recent examples of empirical studies that investigate the connections existing between the degree of competition and the impact of monetary policy on bank lending are: Adams and Amel (2005), Gunji *et al.* (2009) and Olivero *et al.* (2011a,b). Adams and Amel (2005) utilise aggregate US data sampled during the period 1996-2002 to investigate the connections between banking competition and the transmission of monetary policy; the authors determine that the effect of monetary policy on loan originations is lower in markets with higher concentration.

In contrast, Gunji *et al*. (2009) determine that competition interpreted using the H-statistic lowers the severity of the BLC. Correspondingly, Olivero *et al.* (2011a, b) examine the issue regarding whether bank competition affects the BLC in a selection of Asian and Latin American nations sampled from 1996 to 2006; here concentration indices, and the Panzar and Rosse H-statistic yield contradictory results when used to gauge competition. When opting for concentration indices (Olivero *et al.*, 2011a), competition enhances the efficacy of monetary policy. Fungáčová *et al.* (2014) conclude that the variation in results are likely a consequence of the varied components inherent to the banking industry encapsulated in the competition metrics.

Leroy (2014) advocates that banks with market power, proxied via the Lerner index, possess credit supplies which are not as vulnerable to monetary policy shocks in a sample of 11 Eurozone countries from 1999 to 2011. Similarly, a study by Fungáčová *et al.* (2014) affirms that the impact of monetary policy on bank lending is determined by bank competition in the euro area. The authors advise that bank market power exerts a significant influence on the efficacy of monetary policy. As a result, broad differences in the degree of a bank's market power can yield asymmetric effects due to the *"single*

monetary policy". The previously mentioned results contradict an earlier study by Amidu and Wolfe (2013) which investigates a substantial panel dataset sampling 55 nations during the period 2000-2007; these results indicate that more banking sector competition diminishes the effectiveness of monetary policy on bank lending.

2.4 Methodology

2.4.1 The data

In this analysis annual data over the period of 2004-2013 is examined. The sample includes commercial, savings and co-operative banks from 8 new EU accession countries which are as follows: the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia and Slovakia. Given the significant variation between the Maltese and Cypriot banking sectors when compared with sectors in the other countries selected, they were not included in the countries chosen for this study.

Disaggregated bank data can be obtained from Bankscope, a commercial database maintained by International Bank Credit Analysis Ltd. (IBCA) and the Brussels-based Bureau van Dijk which is the primary source of data for European banks. Given that EU-8 joined the EU in 2004, the sample for this study therefore spans from 2004-2013, which should be an adequate duration of time given that an entire cycle of monetary policy is encompassed in this period.[9]

While EU-8 failed to meet the euro area entry requirements when their accession took place, the Treaties of Accession grants them an adjustment period. In other words they are considered Member States but inclusive of a '*derogation*'. Evaluating the BLC during this specific time frame of this study is also crucial because this period saw the

[9] The analysed period from 2004-2013 saw a gradual trend in Mergers and Acquisitions (M&A) in all EU-8 countries. If bank X is merged with bank Y, we treat them as one single entity from the beginning of sample period.

introduction of three nations to the euro area. The first EU-8 nation to join the Eurozone was Slovenia, in 2007 as well as Slovakia in 2009 and Estonia in 2011. Subsequently, their ability to dictate monetary policy has been granted to the ECB.

Matousek and Sarantis (2009) argue that especially the CEE nations have experienced dissimilar "*monetary*", "*fiscal"* and "*transition policies"* and discourage the notion of combining the data since this would generate biased estimates. Similarly, Favero *et al*. (1999) suggest that when employing cross-sectional data from banks located in various nations, interest rates changes would act as a country dummy. As a result this study chooses to unveil the modifications to the BLC in EU-8 by estimating the model individually in each nation sampled. Given that several of the nations are home to a comparatively small number of total banks, we establish the existence of the BLC within Baltic States through combining data sampled from Estonia, Latvia and Lithuania with the purpose of addressing this issue.[10]

2.4.2 Model specification and variables

Within the available literature there are two commonly adopted approaches utilised for testing the BLC. The first is to organise banks with respect to the relevant bank characteristics (bank size, liquidity and capital).[11] Such an approach requires that there be a large number of banks available for sampling. While this might not be an issue in countries such as the US, for example, other nations have relatively fewer banks that prohibit this approach. Alternatively, a panel data model that permits the reaction of bank lending to monetary policy shifts to be contingent on bank characteristics can be used, such as seen in Ehrmann *et al*. (2003); this approach circumvents the aforementioned

[10] The exceptions we make here is by pooling the three Baltic countries, this methodology is in line with Matousek and Sarantis (2009) study.
[11] In order to review research using the first method, consult: Altunbas (2002), Kashyap and Stein (1995, 2000), and Kishan and Opliea (2000, 2006).

problem of numbers of banks using a template derived from Bernanke and Blinder (1988). Consequently, their methodology is employed in this research.

The empirical model used in Ehrmann *et al*. (2003) reveals an equation specific to bank loans, which considers the reaction of bank lending to monetary policy both directly via the influence of the money channel and indirectly by bank characteristics through the BLC. Additionally, the original model has been adapted in order to investigate the impact of the financial crisis on the aforementioned two channels. This is accomplished through introducing a dummy variable (C), which takes the value of 1 for 2008-2011 and zero elsewhere. The equation given below represents the original model.1:

$$\Delta \ln Lit = \alpha i + \beta \, \Delta \ln \, L\,it - 1 + \sum_{j=0}^{1} \delta \, j \, \Delta \ln \, \mathrm{GGDP\ t - j} + \sum_{j=0}^{1} \chi \, j \, \Delta \, \mathrm{R\ t - j}$$
$$+ \sum_{j=0}^{1} \lambda \, j \ \Delta \, \mathrm{CPI\ t - j} + \sum_{k=1}^{4} \theta k \, Zkit - 1 \ + \sum_{k=1}^{4} \sum_{j=0}^{1} \theta kj \, Z \, kit - 1 \, \Delta \, \mathrm{R\ t - j}$$
$$+ \sum_{k=1}^{2} \sum_{h=k+1}^{4} \sum_{j=0}^{1} \rho \, khj \, Z \, kit - 1 \, Zhit - 1 \, \Delta \, \mathrm{R\ t - j} + \varepsilon \, it$$

where i=1,…, N is the number of banks, t=1, ….,T representing the period of inspection from 2004 to 2013; and, j reflects the number of lags. L^{*}[12] denotes bank loans, R represents the short-term interest rates on money markets and is essentially used to reflect the monetary policy stance[13], GGDP and CPI reflect the growth rate of GDP and the inflation rate, respectively, which represent the demand for loan proxies. GGDP is the growth rate of nominal gross domestic product and CPI is the harmonised indices of consumer prices and is represented in a similar configuration as GGDP. Additionally, ln is the natural logarithm operator, Δ is the first difference operator, Z_K represents the K=1,2,3,4 bank characteristics variables: size (*S*), capital (*CAP*), liquidity (*LIQ*) and risk

[12] $\Delta \, lnLit$ represents the difference of the natural logarithm of loans, i.e. the dependent variable.
[13] This consists of the money market rates on deposit with 3 months maturity.

(Risk). Traits which are specific to banks are denoted by *t*-1 with the purpose of reducing a potential endogeneity bias. Lastly, possible fixed-effects among the banks were allowed for by αi and *ε it* indicates the error term.

Size *(S)*, capital *(CAP)*, liquidity (*LIQ)* and risk (*Risk*[14]) are bank-specific characteristics, which are used to assess the existence of the distributional influences of monetary policy on banks.

$$Sit = \ln Ait - \frac{\sum_{i=1}^{Ni} \ln Ait}{Ni}$$

$$CAPit = \frac{Cit}{Ait} - \frac{\sum_{i=1}^{Ni} \frac{Cit}{Ait}}{Ni}{T}$$

$$LIQit = \frac{LAit}{Ait} - \frac{\sum_{i=1}^{Ni} \frac{LAit}{Ait}}{Ni}{T}$$

$$Riskit = \frac{(\mathrm{ROA} + \mathrm{CAR})}{(\mathrm{SDROA})} - \frac{\sum_{i=1}^{Ni} \frac{(\mathrm{ROA} + \mathrm{CAR})}{(\mathrm{SDROA})}}{T}$$

The size of each bank is represented by the natural logarithm of total assets (*A*). Bank capitalisation is assessed here as a ratio of total equity (*CAP*) to total assets, which is also known as the standard capital ratio, liquidity ratio is defined as cash, trading securities and interbank lending of maturities with less than three months to total assets; and, finally, (*Risk)* is characterised by the Z-score[15] as a ratio of the total sum of ROA and the CAR to SDROA. De Nicolo *et al*. (2003) described the Z-index as a proxy measure of a firm's probability of failure, specifically assessing the "*distance to default*". The index is a tool

[14] The value of the index becomes greater with increased return on assets (ROA) and a greater equity capital-to-asset ratio (CAR), but decreases with higher standard deviation of returns on assets (SDROA). As a result, higher values of the index denote a lesser risk profile for a bank. Therefore, a more favourable profile can be attained by increasing ROA by improving profitability, increasing K by decreasing leverage and/or lowering S by improving diversification (De Nicolo *et al*., 2003).

[15] All of the sample years (three years and above) are used in the rolling window when computing the SDROA for each bank.

used to assess systematic risk potential when combined with a group of systematically significant financial institutions.[16]

The aforementioned proxy is a widely acceptable measure of bank risks and can be deemed as an accounting based risk indicator. Craig and Santos (1997) and Lown *et al.* (2000a) both used the Z-score as a proxy for measuring risk when looking at the U.S. bank Holding Companies (BHCs). De Nicolo *et al.* (2004) employed the Z-index of the aggregate of the largest five banks in their analysis of 500 largest financial institutions worldwide. Berger *et al.* (2009) measured financial stability in 30 developed countries utilising the Z-index. Additionally, Uhde and Heimeshoff (2009) studied the impact of national banking market concentration on financial stability for the 25 Member States of the EU (EU-25) using the same proxy.

In order to expand upon the work done in Ehrmann *et al*. (2003) and Gambacorta (2005), in our case each of the four banks characteristics must be normalised in the context of their average across all the banks. This is done with the purpose of producing indicators that equal a value of zero over all observations. Accordingly, in the previously discussed regression Model. 1, the average of the interaction terms (Δ R t $-$ j ∂ Size it $-$ 1, Δ R t $-$ j ∂ $Liq\ it-1$, Δ R t $-$ j ∂ $Cap\ it-1$ and Δ R t $-$ j ∂ $Risk\ it-1$) 1 also produces a value of zero. Furthermore, the monetary policy effect for the average bank can be directly understood by parameters χj.

The size indicator has been normalised not only in terms of the average of the entire period of the sample, but also in terms of each solitary period, which eliminates

[16] For studies using the z-score as a measure of bank soundness, see, among others; Demirgüç-Kunt *et al*. (2008), Angkinand and Wihlborg (2008), Delis *et al*. (2011).

undesirable trends with respect to size; specifically, that which could arise as a result of the premise that size is measured in nominal terms.

Here bank-level gauge of competition is employed, which in contrast to additional measures (Herfindahl- index and the market share of *n*-biggest banks in the system), in order to contrast market power in various banks. In keeping with the novel Industrial Organisation (IO) method, the market power is ascertained via Lerner index which confers the added benefit inherent in a separate, dynamic gauge of market power (Brämer *et al.*, 2013). The Lerner index gauges the banks' capacity to increase prices in excess of marginal costs; this index with greater units therefore suggests greater market power and reduced competitive market conditions. Moreover, the Lerner index is determined as the proportion of the remainder between price of output and marginal cost to the price, the latter of which is calculated utilising the proportion of total revenues to total assets. Marginal cost is calculated based on a translog cost function with one output (total assets) as well as the subsequently listed three input prices: price of labour, price of capital and price of funds.

A cost function utilising panel data of bank fixed effects is calculated, incorporating time dummy variables to control for heterogeneity in the available sample. Linear homogeneity restrictions are applied to input prices as suggested in Weil (2013) and Fungáčová *et al.* (2014). This is done by normalising total costs as well as input prices via one input price. Accordingly, the cost function has the following designation:

$$\ln\left(\frac{TC}{W3}\right) = \alpha_0 + \alpha_1 \ln y + \frac{\alpha 2}{2}(\ln y)^2 + \alpha_3 \ln\left(\frac{W1}{W3}\right) + \alpha_4 \ln\left(\frac{W2}{W3}\right) + \alpha_5 \ln\left(\frac{W1}{W3}\right) \ln\left(\frac{W2}{W3}\right) + \frac{\alpha 6}{2}$$
$$\left(\ln\left(\left(\frac{W1}{W3}\right)^2 + \frac{\alpha 7}{2}\left(\ln\left(\left(\frac{W2}{W3}\right)^2 + \alpha_8 \ln y \ln\left(\frac{W1}{W3}\right) + \alpha_9 \ln y \ln\left(\frac{W2}{W3}\right) + \varepsilon\right)\right)\right) \quad \textbf{(1)}$$

where TC represents the total cost which is calculated as the total of personnel expenses, other non-interest expenses and interest paid. Y denotes total assets, w_1 denotes

the price of labour estimated as a proportion personnel expenses to total assets, w_2 symbolises the price of physical capital and is estimated as a proportion of non-interest expenses to fixed assets. Finally, w_3 denotes the price of borrowed funds, defined as the ratio of interest expenses to deposits and short-term funding. The measured coefficients of the cost function from the preceding cost function are subsequently utilised to calculate the marginal cost (MC):

$$MC = \frac{TC}{y}\left(\alpha_1 + \alpha_2 \ln y + \alpha_8 \ln\left(\frac{W1}{W3}\right) + \alpha_9 \ln\left(\frac{W2}{W3}\right)\right) \quad \textbf{(2)}$$

After marginal cost and the price of output are estimated, this facilitates the calculation of the Lerner index specific to every bank sampled and consequently a complete estimation of bank competition.

2.4.3 Research questions

The following are the three research questions which can be verified utilising the equation outlined in Model. 1: (1) Do specific components pertaining to banks, such as size, capital, liquidity and risk factor, influence the loan supply? (2) Is the presence of a BLC for monetary policy substantiated by the data? (3) Does the period of financial crisis include movement on the banks' lending behaviour?

The first question can be tested by adopting the following reasoning: for instance, when examining the influence on bank lending as a consequence of a variation in bank size conveyed via: $\Delta ln\, Lit / \Delta S_{t-1}$ (in which θ_S is the designated coefficient for bank size in the vector θ). Given that $\theta_S > 0$, it demonstrates that large banks supply additional loans.

Accordingly, through adopting this methodology the validity of the subsequent assumptions can be verified: high risk, less liquid and poorly capitalised banks are more vulnerable to provide loans in relation with their counterparts on the opposite side of the spectrum, i.e., low risk, highly liquid and well capitalised banks. It is suggested here that

the interaction term of the bank-specific characteristics with the short-term interest rate will serve to demonstrate the distributional effects of the monetary policy position.

The second question is verified using the following analysis below:

If $(\partial^2 \Delta ln\, Lit/\partial\, \Delta Rt - j\partial Sit - 1) > 0$,this means that lending activity present in large banks is less vulnerable to monetary policy changes than that of small banks.

Banks with higher liquidity can extend credit by reducing their liquid assets supply; this implies that $(\partial^2 \Delta ln\, Lit/\partial\, \Delta Rt - j\partial LIQit - 1) > 0$. Therefore, less liquid banks must reduce their loan portfolio.

Banks possessing higher capitalisation are not as vulnerable to monetary policy changes, which suggests that $(\partial^2 \Delta ln\, Lit/\partial\, \Delta Rt - j\partial CAPit - 1) > 0$.

An analogous relationship exists for bank risks. This theory states that low risk banks are less sensitive to monetary policy changes; this means $(\partial^2 \Delta ln\, Lit/\partial\, \Delta Rt - j\partial Riskit - 1) > 0$.

Therefore, the existence of a BLC implies that the two-way interaction terms will contain positive coefficients in the aforementioned model, i.e, $\emptyset kj > 0$.

An additional consideration of this study[17] examines if the following three-way interaction terms are important indicators of loan growth:

$$Size\ it-1 * LIQ\ it-1 *\ \Delta Rt,\ Size\ it-1 * LIQ\ it-1 *\ \Delta Rt-1,\ Size\ it-1 * CAP\ it-1 *\ \Delta Rt,\ Size\ it-1 * CAP\ it-1 *\ \Delta Rt-1,\ Size\ it-1 * Risk\ it-1 * \Delta Rt,\ Size\ it-1 * Risk\ it-1 *\ \Delta Rt-1,\ LIQ\ it-1 * CAP\ it-1 * \Delta Rt, LIQ\ it -$$

[17] Note that positive coefficients on these three-way interaction terms in the presence of a BLC (i.e., $\rho khj > 0$) are predicted using the same principles and reasoning described for two-way interaction terms (see Appendix. B, Table B1 for a comprehensive synopsis of the predicted signs of coefficients).

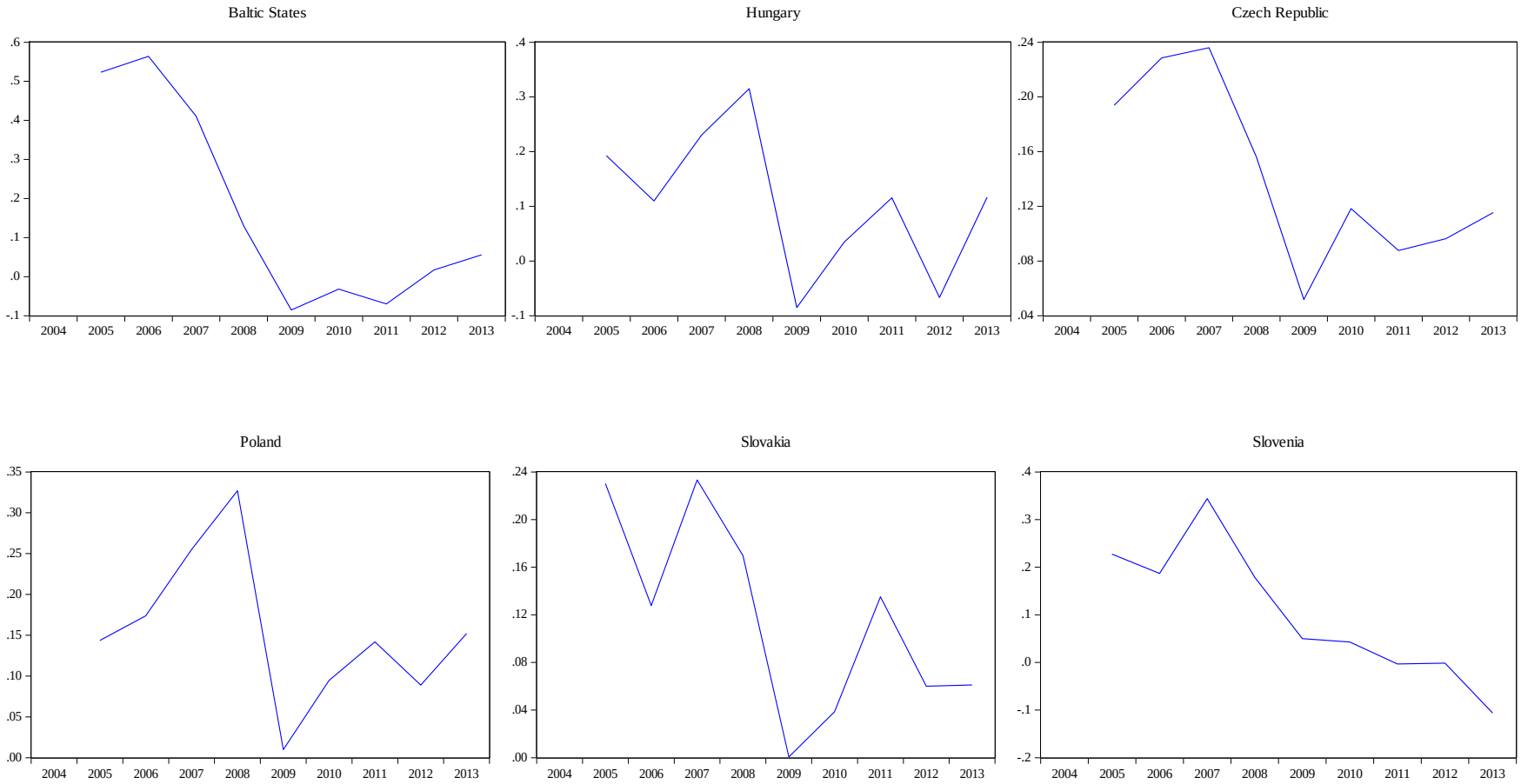
$1 * CAP\ it - 1 * \Delta Rt - 1\ , LIQ\ it - 1 * Risk\ it - 1 * \Delta Rt,\ \ LIQ\ it - 1 * Risk\ it - 1 * \Delta R\ t - 1,\ \ CAp\ it - 1 * Risk\ it - 1 * \Delta Rt,\ \ CAp\ it - 1 * Risk\ it - 1.$

The third test is conducted through adopting and using the same approach as outlined in the first and second question; thus, this can be achieved by examining the statistical significance specific to the coefficient found for the time frames of (2008-2011) financial crises with the purpose of uncovering the potential role of bank-specific characteristics and possible changes to the BLC of monetary policy during the aforementioned phase.

Moreover, further analysis is necessary to determine if the BLC of monetary policy is influenced via bank market power in the context of a supplemental bank-specific trait, in addition to size, liquidly, capital and risk. Utilising the aforementioned reasoning, the non-interacted and two-way interaction terms between bank competition and monetary policy changes are considered with the purpose of investigating if bank competition affects the MTM in the newly accessed EU States.

Figure 1 shows the fact that, following 2007, the average lending growth rate in EU-8 States experienced a significant decline and has not since recovered. Since 2009 only volatile, inconsistent growth was reported with the lowest rates seen in Baltic States, Slovakia, the Czech Republic and Poland all in 2009, and Slovenia in 2013.

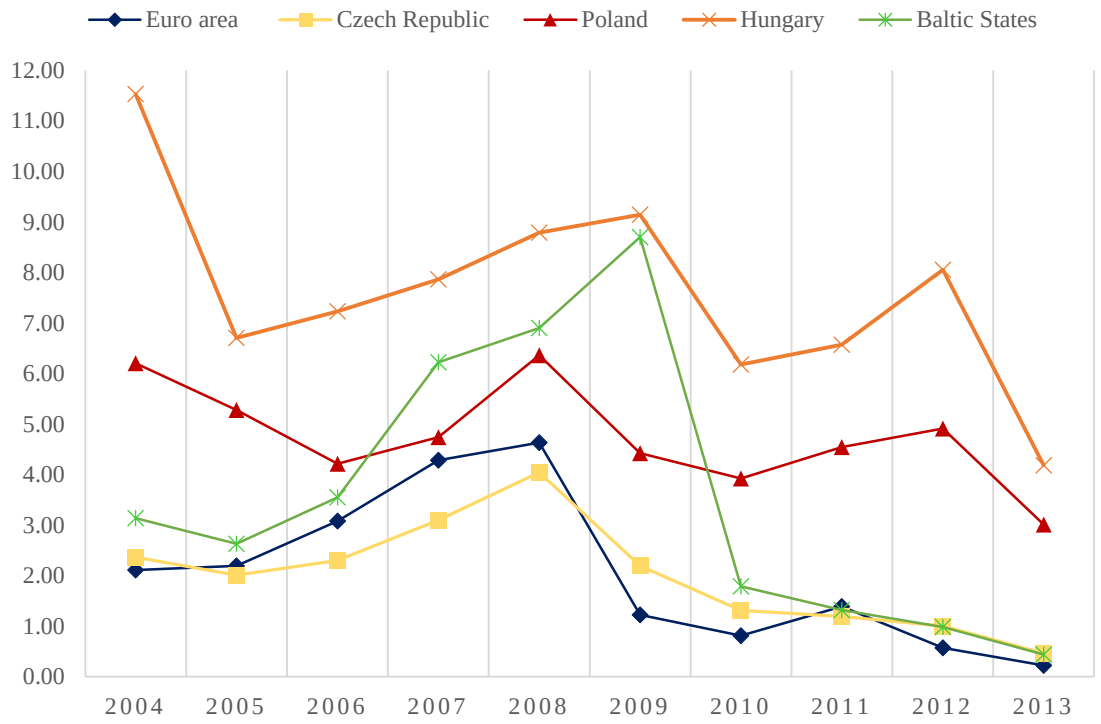
Figure 1: Average lending growth rate from 2004-2013



Source: (Bankscope, 2016)

This research utilises the money market interest rates as the monetary policy rate. Figure 2 illustrates a comparative analysis of the changes in three month money market rates (ΔR) in selected EU-8 States and the euro area. The data indicates that the central banks of the nations investigated fix the policy rates based on and very similar to their counterparts' decisions. Moreover, nations that became members of the euro area, including and after 2007, stopped announcing money market rates individually once they joined the euro area and the unified interbank market within this union.

Figure 2: Money market interest rates, deposit liabilities, 3 months (80-100 days maturity) annual frequency



Source: (ECB, Eurostat, OECD and Central Banks)

2.5 Estimation results

Model.1 comprises cross-sectional fixed-effects and a lagged dependent variable. The latter component necessitates the utilisation of a Generalized Method of Moments (GMM) estimation procedure when examining a panel containing a comparatively small time-series dimension, i.e. *T* is at most 10 in our sample.

Given that Model.1 also consists of a lagged dependent variable, GMM must be used in order to estimate it as suggested in Arellano and Bond (1991); specifically, in this case the Arellano and Bond two-step system estimator containing corrected coefficient standard errors from Windmeijer (2005) is appropriate here. When examining GMM regressions on simulated panels, Windmeijer (2005) determines that the two-step efficient GMM is superior to the one-step system, given that it allows for reduced standard errors and bias. Furthermore, Roodman (2009) notes that the two-step system with the Windmeijer (2005) correction yields comparatively accurate modelling, supporting the notion of the superiority of the two-step estimation with corrected standard errors approach over the robust one-step. As a result it produces a system consisting of two equations, the original and transformed equations, which are collectively termed system GMM. The combined two-step estimator holds against any number of cross-correlation and heteroskedastic patterns that the sandwich covariance estimator represents, and is efficient (Roodman, 2009).

Caution must be taken when presupposing the presence of fixed-effects and dynamics because such an assumption could negatively affect inference, which is in keeping with contemporary estimation practices presented in Akinci *et al.* (2013) and Fungáčová *et al.* (2014). The dynamic equation illustrated in Model.1 is commonly analysed via the Arellano and Bond GMM methodology described in Arellano and Bond (1991). However, the dynamics in the levels of data are not evident since they are not presented

in their first differences. Given that annual data as opposed to quarterly data is utilised here, the outcome is actually not unexpected. When considering that Fungáčová *et al.* (2014) underline the idea that a convincing argument can be made regarding the reason why lending in the previous quarter could affect contemporary lending, the study also suggests that it would be more difficult to find an economic justification that explains why the previous year's lending should affect the present year's lending; this is consistent with the evaluation of Turkish monetary policy seen in Akinci *et al*. (2013). Accordingly, the Model. 1 is tested via the panel fixed effects[18] as our preferred specification while omitting the lagged dependent variable.[19]

2.5.1 Does the data support the existence of a BLC for monetary policy in the CEE States?

The primary estimations with respect to the total period analysed are first considered and the results specific for the financial crisis are subsequently compared with the purpose of elucidating the potential role of banks in monetary policy transmission.

Here the findings of the empirical analysis concerning the BLC of MTM within in the newly accessed EU States are outlined (see Tables 4A-4F). With respect to bank-specific traits, the model is initially estimated using individual characteristic in a segmented process as documented in columns 1-4 and subsequently with every possible three-way interaction term as illustrated in columns 5-10, and ultimately using each of the four characteristics collectively as shown in column 11.

[18] Employing the fixed effects specification here is warranted following a Hausman test. In order to circumvent issues with collinearity concerning the specified variables, first correlations of every variable are evaluated. A high level of correlation between variables employed in all models were not observed.

[19] In this methodology time period fixed-effects cannot be included since macroeconomic variables only show changes in time instead of being spread across banks; therefore, they would be flawlessly collinear with period effects.

Somewhat unexpectedly it can been seen that the growth of bank lending in response to the monetary policy stance derived from money market rates in the short term is not significant with the exception of the Czech Republic and Slovenia, i.e. the results indicate no direct correlation between the two via the money lending channel. Hence, the theory of a direct correlation is unsubstantiated, yet an indirect influence through the BLC is supported and documented below.

When evaluating the instances in which each bank-specific trait appears individually, it can be determined that the bank size is significant in most countries except in the Czech Republic and Slovenia, while it bears a negative coefficient which could support the argument that smaller banks could have more variable lending activity if newly founded, relative to the larger banks. The results from the two and three-way interaction terms of these bank-specific attributes uphold the previous findings for bank size in all the newly accessed EU States; where the trend of the coefficient sign stays intact.

Liquidity is determined to have a significant influence in the majority of nations when entering along with other bank-specific traits, yet solely in Hungary and Slovakia when employed by itself. Capitalisation maintains the expected positive coefficient with a propensity to be significant only in the case of Slovenia. The negative and significant correlation shows that banks in Slovakia have a greater inclination to secure their capital levels rather than to utilise funds to issue fresh loans to borrowers. Finally, the degree of risk reveals a significant positive coefficient just in Hungary, and is unlikely to be statistically significant for most of the rest of the countries.

Yet, with the purpose of evaluating monetary policy and its distributional effects, and establishing the existence of the BLC within the EU new Member States, the coefficients

of the interaction terms between the traits specific to banks and the monetary policy measurements require investigation.

The interaction term of bank size on its own with the interest rates is not statistically significant. Furthermore, bank size becomes statistically insignificant when entering along with other bank-specific characteristics in all countries except in the case of Baltic States and Hungary. In contrast to the findings in Matousek and Sarantis (2009) for 8 CEE countries, Horváth *et al*. (2006) for Hungary, Pruteanu (2007) for the Czech Republic, and Wróbel and Pawlowska (2002) for Poland, we find no evidence to support the role of bank size in the newly EU accession nations. This finding is in line with studies that examined the BLC with reference to Western European banks (Ehrmann *et al.,* 2003; Altunbas *et al*., 2002; Gambacorta, 2005; Altunbas *et al.*, 2010; Gambacorta and Marques-Ibanez, 2011; Fungáčová *et al.*, 2014; among others). We find that bank liquidity is a crucial differentiating factor in the reaction of banks to changes in the monetary policy stance within few investigated countries. Of particular interest is that despite the fact that the interaction term for bank liquidity and interest rates for Poland is statistically significant, it carries a negative coefficient which is inconsistent with the BLC hypothesis and cannot be utilised to determine whether the channel exists. Nevertheless, there is evidence to establish the existence of the BLC via bank liquidity in Slovakia where the interaction terms of bank liquidity on its own with the interest rates are statistically significant in most cases. Comparable supporting evidence for the influence of bank liquidity is documented in Ehrmann *et al*. (2003), Gambacorta (2005), Altunbas *et al.* (2010) and Leroy (2014), among others.

Bank capitalisation appears to be a significant, contributing bank-specific characteristic when evaluating the banks' response to monetary policy changes in Baltic States and Slovakia. When considering the three-way interaction terms, it is observed that well-

capitalised and low risk banks realised more loan growth in Poland and the Czech Republic. This assessment upholds the previous study by Matousek and Saranatis (2009) which suggests that the effect of bank capital on the banks' reaction to monetary policy variation is important in the Czech Republic, Poland and Slovak Republic. Concerning the CEE countries, the results here are similar to earlier investigations that obtained results supporting the influence of capitalisation in the Czech Republic (Pruteanu, 2007) and Poland (Wróbel and Pawlowska, 2002).

Given that the standard capital to asset ratio is an accounting-based indicator, it has received lots of criticism, specifically during the onset of financial crises, for not capturing the risk tailored to the crisis. The inclusion of the Tier-1 ratio helps us to fully capture the capital adequacy of banks.[20]

The data indicates that the role of capital is unrelated to the indicator of capitalisation that was used. In support of the available literature with respect to the BLC, the importance of the tier-1 ratio in a sound banking system must be acknowledged. Here it is suggested that the results found in this study would be inverted, in the instance that unrestricted access to all the bank data from the sample and period evaluated was possible. Matousek and Saranatis (2009) rationalise that the potential issues is not likely to be the capitalisation of lone banks but instead the whole bank network. Additionally, Ehrmann *et al*. (2003) postulate that bank capitalisation could have already reached a point at which bank lending activity is uninfluenced by changes in monetary policy stance. Yet, the influence of bank capitalisation most specifically during the financial crisis could be worthwhile noting.

[20] The available data on the tier-1 ratio is limited to less than a quarter of the total sample in the majority of countries.

Finally, bank risk seems to have a significant role in the assessment of the banks' response to monetary policy changes in Slovenia and Slovakia. This is in keeping with the postulation made by Altunbas *et al.* (2010) and Gambacorta and Marques-Ibanez (2011). Whereas some conflicting data is present for Baltic States, there is no corroborating data in Hungary.

A sensitivity analysis is also carried out within this study by considering two further variables in the original specification with the purpose of ascertaining whether the aforementioned variables are significant contributors to the bank credit supply; these include Non-Performing Loans (NPLs) And Loan Loss Provisions (LLPs) as a percentage of gross loans.

The two additional accounting-based risk indicators known as NPLs and LLPs. NPLs show the quality of bank-held assets and the possible negative exposure to asset market values and earnings as a result of a decline in quality of loans, while LLPs are defined as a proportion of loans for an ex-post indicator of credit risk. Yet, when examining non-interacted and two-way interacted variables between these two risk indicators and the monetary policy indicator, no supporting evidence is obtained.

With respect to demand which is proxied by both the GDP growth (GGDP) and inflation (CPI), the current value of GGDP is determined to be statistically significant in most cases where the demand has a conceivable positive coefficient, which implies a significant impact on credit growth. Favourable economic conditions are conducive to expanded loan supply by banks. Yet, the CPI proxy is statistically insignificant in most cases while also bearing a negative coefficient.

Table 4A: Estimates of Model.1 using bank data in Baltic States (2004-2013)

	Size	Liq	Cap	Risk	Size Liq	Size Cap	Size Risk	Liq Cap	Liq Risk	Cap Risk	Size Liq Cap Risk
Specification	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
ΔR_t	-0.0064	-0.0099	-0.0130	-0.0099	0.0050	-0.0102	-0.0083	-0.0070	-0.0058	-0.0154	0.0005
ΔR_{t-1}	0.0061	0.0023	-0.0005	0.0017	0.0091	0.0020	-0.0055	0.0027	0.0012	-0.0020	0.0080
$GGDP_t$	1.686***	2.058***	1.994***	2.018***	1.457***	1.718***	1.726***	1.922***	1.905***	1.985***	1.482***
$GGDP_{t-1}$	0.799*	0.6090	0.8800	0.6860	0.4940	0.872*	0.829*	0.7460	0.6570	0.8950	0.626*
CPI_t	-0.035***	-0.0326*	-0.0357**	-0.0328*	-0.030***	-0.035***	-0.035***	-0.0331**	-0.0312*	-0.0348**	-0.0312***
CPI_{t-1}	0.0171	0.0374***	0.0334**	0.0327**	0.0110	0.0192	0.0175	0.0315**	0.0299*	0.0313*	0.0129
$Size_{it-1}$	-0.360*				-0.439*	-0.3530	-0.379*				-0.450*
$Size_{it-1} \times \Delta R_t$	0.0075*				0.0090*	0.0021	0.0001				0.0000
Liq_{it-1}		0.2480			0.985*			0.2490	0.2330		1.015**
$Liq_{it-1} \times \Delta R_t$		-0.0254			0.0168			0.0010	0.0443		0.0329
Cap_{it-1}			0.4230			-0.4230		0.3710		0.5480	0.5880
$Cap_{it-1} \times \Delta R_t$			-0.253*			-0.2140		-0.2180		-0.2760	-0.0974
$Risk_{it-1}$				0.0062			-0.0058		0.0067	-0.0010	-0.0141
$Risk_{it-1} \times \Delta R_t$				-0.0019			-0.0021		-0.0022	-0.0011	-0.0019
$Size_{it-1} \times \Delta R_{t-1}$	0.0022				0.0003	0.0052	-0.0010				0.0028
$Liq_{it-1} \times \Delta R_{t-1}$		-0.0119			-0.0609			-0.0146	-0.0117		-0.0286
$Cap_{it-1} \times \Delta R_{t-1}$			0.0729			0.0282		0.0366		0.245*	0.1470
$Risk_{it-1} \times \Delta R_{t-1}$				-0.0004			-0.0024**		-0.0007	-0.0011	-0.0011
$Size_{it-1} \times Liq_{it-1} \times \Delta R_t$					0.0058						
$Size_{it-1} \times Liq_{it-1} \times \Delta R_{t-1}$					-0.0236						
$Size_{it-1} \times Cap_{it-1} \times \Delta R_t$						-0.0097					
$Size_{it-1} \times Cap_{it-1} \times \Delta R_{t-1}$						-0.0566					
$Size_{it-1} \times Risk_{it-1} \times \Delta R_t$							-0.0001				
$Size_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$							-0.0016**				
$Liq_{it-1} \times Cap_{it-1} \times \Delta R_t$								-1.078*			
$Liq_{it-1} \times Cap_{it-1} \times \Delta R_{t-1}$								-0.8260			
$Liq_{it-1} \times Risk_{it-1} \times \Delta R_t$									-0.0021		
$Liq_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$									0.0020		
$Cap_{it-1} \times Risk_{it-1} \times \Delta R_t$										0.0170	
$Cap_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$										0.0079	
REG	-0.209**	-0.277*	-0.292**	-0.265**	-0.210**	-0.203*	-0.199**	-0.285**	-0.272**	-0.285**	-0.202*
Intercept	0.376*	0.358*	0.393*	0.359*	0.439*	0.341*	0.363*	0.400*	0.391*	0.387*	0.424*
R-squared	0.522	0.353	0.401	0.386	0.568	0.534	0.549	0.401	0.383	0.413	0.600
Number of observations	231	231	231	225	231	231	225	231	225	225	225

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔR_t = yearly change of the short-term interest rate; $Size_{it-1}$ = log of total assets; Liq_{it-1} = liquidity ratio; Cap_{it-1} = capital to asset ratio and $Risk_{it-1}$ = return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA). Standard errors are robust yet are not depicted. REG denotes regulation variable concerning the degree that banks are permitted to commence activities within securities, insurance, real estate and non-financial sectors from World Bank indices on bank regulation (Barth *et al.,* 2004). The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table 4B: Estimates of Model.1 using bank data in Czech Republic (2004-2013)

	Size	Liq	Cap	Risk	Size Liq	Size Cap	Size Risk	Liq Cap	Liq Risk	Cap Risk	Size Liq Cap Risk	Foreign
Specification	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
ΔR_t	-0.201*	-0.1890	-0.158*	-0.2120	-0.1420	-0.172*	-0.199*	-0.1620	-0.1870	-0.166*	-0.1540	-0.198*
ΔR_{t-1}	0.471**	0.434**	0.395**	0.475**	0.381*	0.430**	0.468**	0.397**	0.432**	0.403**	0.378**	0.436**
$GGDP_t$	1.785***	2.097***	1.867***	2.314**	1.604**	1.723**	1.859***	1.879**	2.122***	1.824***	1.788**	2.026**
$GGDP_{t-1}$	-1.176*	-0.970*	-0.788*	-1.038**	-0.822*	-0.943*	-1.140*	-0.817*	-0.932*	-0.926*	-0.778*	-1.023*
CPI_t	-0.0674**	-0.072***	-0.0675**	-0.073***	-0.0613**	-0.067***	-0.068***	-0.0675**	-0.0711**	-0.0715**	-0.0658**	-0.0717**
CPI_{t-1}	-0.185*	-0.167*	-0.149*	-0.182*	-0.147*	-0.165*	-0.183*	-0.150*	-0.168*	-0.155*	-0.141*	-0.151*
$Size_{it-1}$	-0.1040				-0.0602	-0.0379	-0.0871				-0.0080	-0.0301
$Size_{it-1} \times \Delta R_t$	0.0118				0.0006	-0.0039	0.0096				-0.0066	0.0118
Liq_{it-1}		0.0179			0.0110			0.0063	0.0242		0.0085	-0.0506
$Liq_{it-1} \times \Delta R_t$		-0.3320			-0.1760			-0.3050	-0.2960		-0.3380	-0.385**
Cap_{it-1}			0.5640			-0.3350		0.5080		0.7410	0.8830	-2.0090
$Cap_{it-1} \times \Delta R_t$			-0.2980			-0.3430		-0.3620		-0.748*	-0.6290	-0.4430
$Risk_{it-1}$				0.0035			0.0011		0.0027	-0.0019	-0.0016	0.0039
$Risk_{it-1} \times \Delta R_t$				0.0007			0.0004		0.0000	0.0018	0.0008	0.0009
$Size_{it-1} \times \Delta R_{t-1}$	0.0158				0.0026	0.0053	0.0160				0.0044	-0.0088
$Liq_{it-1} \times \Delta R_{t-1}$		-0.1970			-0.0544			-0.0834	-0.2250		-0.0479	-0.0533
$Cap_{it-1} \times \Delta R_{t-1}$			0.0037			0.1540		0.1690		-0.1770	0.3460	0.2930
$Risk_{it-1} \times \Delta R_{t-1}$				0.0001			-0.0005		-0.0004	0.0006	-0.0002	-0.0003
$Size_{it-1} \times Liq_{it-1} \times \Delta R_t$					0.2360							
$Size_{it-1} \times Liq_{it-1} \times \Delta R_{t-1}$					0.0299							
$Size_{it-1} \times Cap_{it-1} \times \Delta R_t$						-0.4500						
$Size_{it-1} \times Cap_{it-1} \times \Delta R_{t-1}$						0.3230						
$Size_{it-1} \times Risk_{it-1} \times \Delta R_t$							-0.0001					
$Size_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$							0.0003					
$Liq_{it-1} \times Cap_{it-1} \times \Delta R_t$								1.1390				
$Liq_{it-1} \times Cap_{it-1} \times \Delta R_{t-1}$								-0.8010				
$Liq_{it-1} \times Risk_{it-1} \times \Delta R_t$									0.0025			
$Liq_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$									-0.0089			
$Cap_{it-1} \times Risk_{it-1} \times \Delta R_t$										0.0102		
$Cap_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$										0.0364*		
Intercept	0.823**	0.754**	0.693**	0.791**	0.681**	0.745**	0.814**	0.697**	0.750**	0.730**	0.675**	0.698*
R-squared	0.312	0.380	0.344	0.275	0.412	0.334	0.286	0.425	0.378	0.362	0.410	0.457
Number of observations	130	130	130	130	130	130	130	130	130	130	130	107

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔR_t = yearly change of the short-term interest rate; $Size_{it-1}$ = log of total assets; Liq_{it-1} = liquidity ratio; Cap_{it-1} = capital to asset ratio and $Risk_{it-1}$ = return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA). Standard errors are robust yet are not depicted. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table 4C: Estimates of Model.1 using bank data in Hungary (2004-2013)

	Size	Liq	Cap	Risk	Size Liq	Size Cap	Size Risk	Liq Cap	Liq Risk	Cap Risk	Size Liq Cap Risk	Foreign
Specification	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
ΔR_t	0.0040	0.0047	-0.1030	-0.0669	0.0556	0.0172	0.0375	-0.0106	0.0029	-0.0654	0.1350	0.0481
ΔR_{t-1}	-0.0029	-0.0553	-0.0331	-0.0261	-0.0241	0.0167	0.0136	-0.0601	-0.0534	-0.0190	-0.0037	-0.0418
$GGDP_t$	2.6020	0.2600	0.5610	0.6900	1.4870	3.0380	2.9400	0.0650	0.2070	0.7650	2.6270	-0.1280
$GGDP_{t-1}$	0.0169	-1.3290	2.0670	1.3270	-1.876*	-0.2420	-0.5120	-1.1770	-1.3370	1.2910	-3.672***	-3.3880
CPI_t	-0.0347	0.0413	0.0981	0.0727	-0.0318	-0.0665	-0.0743	0.0579	0.0421	0.0692	-0.1270	-0.0045
CPI_{t-1}	0.0536	0.0947**	0.0166	0.0267	0.0974***	0.0534	0.0536	0.0984**	0.0891**	0.0261	0.126***	0.149**
$Size_{it-1}$	-0.719**				-0.474***	-0.811**	-0.771**				-0.657***	-0.719*
$Size_{it-1} \times \Delta R_t$	0.0024				0.0084	0.0052	0.0104*				0.0118	-0.0119
Liq_{it-1}		3.481**			2.985***			3.576*	3.186*		3.126**	2.209**
$Liq_{it-1} \times \Delta R_t$		0.0692			0.1600			0.0901	0.0806		0.1720	-0.0557
Cap_{it-1}			1.6700			-1.0400		-0.0302		-0.9840	-5.2240	-2.8750
$Cap_{it-1} \times \Delta R_t$			0.2060			0.0440		-0.1530		-0.0933	-0.3890	-0.5560
$Risk_{it-1}$				0.0265			0.0093		0.0098	0.0347	0.0437*	0.0285*
$Risk_{it-1} \times \Delta R_t$				0.0009			0.0000		-0.0008	0.0016	-0.0005	0.0001
$Size_{it-1} \times \Delta R_{t-1}$	0.0007				0.0037	0.0061	0.0023				-0.0052	-0.0014
$Liq_{it-1} \times \Delta R_{t-1}$		0.0502			0.125*			0.0805	0.1910		0.0297	0.1850
$Cap_{it-1} \times \Delta R_{t-1}$			0.0190			0.3710		-0.1550		-0.3060	-0.4080	0.1570
$Risk_{it-1} \times \Delta R_{t-1}$				0.0006			0.0008		0.0000	0.0025	0.0012	0.0006
$Size_{it-1} \times Liq_{it-1} \times \Delta R_t$					0.0432							
$Size_{it-1} \times Liq_{it-1} \times \Delta R_{t-1}$					0.0466							
$Size_{it-1} \times Cap_{it-1} \times \Delta R_t$						-0.1670						
$Size_{it-1} \times Cap_{it-1} \times \Delta R_{t-1}$						0.1020						
$Size_{it-1} \times Risk_{it-1} \times \Delta R_t$							0.0004					
$Size_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$							0.0001					
$Liq_{it-1} \times Cap_{it-1} \times \Delta R_t$								-0.2970				
$Liq_{it-1} \times Cap_{it-1} \times \Delta R_{t-1}$								-1.5280				
$Liq_{it-1} \times Risk_{it-1} \times \Delta R_t$									0.0046			
$Liq_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$									0.0164			
$Cap_{it-1} \times Risk_{it-1} \times \Delta R_t$										0.0069		
$Cap_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$										-0.0038		
Intercept	0.0254	-0.554	-0.536	-0.418	-0.161	0.194	0.296	-0.658	-0.535	-0.397	0.274	-0.308
R-squared	0.203	0.304	0.028	0.044	0.370	0.189	0.192	0.282	0.289	0.013	0.413	0.636
Number of observations	140	140	140	136	140	140	136	140	136	136	136	87

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔR_t = yearly change of the short-term interest rate; $Size_{it-1}$ = log of total assets; Liq_{it-1}= liquidity ratio; Cap_{it-1}= capital to asset ratio and $Risk_{it-1}$= return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA). Standard errors are robust yet are not depicted. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table 4D: Estimates of Model.1 using bank data in Poland (2004-2013)

	Size	Liq	Cap	Risk	Size Liq	Size Cap	Size Risk	Liq Cap	Liq Risk	Cap Risk	Size Liq Cap Risk	Foreign
Specification	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
ΔR_t	0.0079	-0.0574	-0.0740	-0.0718	0.0172	0.0744	0.0303	-0.0762	-0.0619	-0.0914	0.0545	0.0657
ΔR_{t-1}	0.0015	0.131*	0.0900*	0.0981*	0.0329	-0.0471	-0.0123	0.124**	0.134*	0.101*	-0.0143	-0.0027
$GGDP_t$	0.5110	1.3790	1.5780	1.6610	0.2010	-0.4070	0.2730	1.3540	1.3630	1.6340	-0.4360	-0.3690
$GGDP_{t-1}$	0.0702	-0.7190	-0.2100	-0.2260	-0.4460	0.1810	0.1240	-0.7580	-0.7460	-0.2960	-0.3400	-0.4510
CPI_t	0.0004	0.0348	0.0422	0.0444	-0.0089	-0.0570	-0.0192	0.0453	0.0383	0.0512	-0.0443	-0.0549
CPI_{t-1}	-0.0074	-0.1240	-0.0878	-0.0883	-0.0511	0.0312	0.0057	-0.1320	-0.1270	-0.0974	-0.0135	-0.0193
$Size_{it-1}$	-0.384*				-0.388*	-0.474*	-0.417*				-0.467*	-0.511*
$Size_{it-1}\times\Delta R_t$	-0.0045				-0.0034	-0.0069	-0.0040				-0.0057	-0.0138
Liq_{it-1}		0.4520			0.5350			0.5170	0.5800		0.4190	0.5420
$Liq_{it-1}\times\Delta R_t$		-0.487*			-0.536**			-0.523*	-0.510**		-0.526**	-0.559**
Cap_{it-1}			-0.0047			-3.6510		0.4740		-0.7820	-2.9570	-3.8370
$Cap_{it-1}\times\Delta R_t$			-0.5560			-0.6510		-0.7810		-0.3020	-1.0090	-1.512*
$Risk_{it-1}$				0.0014			-0.0068		0.0056	0.0073	-0.0017	-0.0003
$Risk_{it-1}\times\Delta R_t$				-0.0008			-0.0004		-0.0010	-0.0006	0.0001	0.0006
$Size_{it-1}\times\Delta R_{t-1}$	0.0011				0.0083	-0.0008	-0.0001				0.0020	0.0029
$Liq_{it-1}\times\Delta R_{t-1}$		0.2280			0.2570			0.225*	0.291**		0.1730	0.1850
$Cap_{it-1}\times\Delta R_{t-1}$			-0.2500			-0.2590		-0.3620		-0.1640	-0.3890	-0.4840
$Risk_{it-1}\times\Delta R_{t-1}$				-0.0002			-0.0004		-0.0003	0.0006	-0.0003	-0.0002
$Size_{it-1}\times Liq_{it-1}\times\Delta R_t$					-0.0085							
$Size_{it-1}\times Liq_{it-1}\times\Delta R_{t-1}$					0.1880							
$Size_{it-1}\times Cap_{it-1}\times\Delta R_t$						0.1640						
$Size_{it-1}\times Cap_{it-1}\times\Delta R_{t-1}$						0.1840						
$Size_{it-1}\times Risk_{it-1}\times\Delta R_t$							0.0001					
$Size_{it-1}\times Risk_{it-1}\times\Delta R_{t-1}$							0.0000					
$Liq_{it-1}\times Cap_{it-1}\times\Delta R_t$								0.3120				
$Liq_{it-1}\times Cap_{it-1}\times\Delta R_{t-1}$								-1.4310				
$Liq_{it-1}\times Risk_{it-1}\times\Delta R_t$									0.0010			
$Liq_{it-1}\times Risk_{it-1}\times\Delta R_{t-1}$									-0.0088*			
$Cap_{it-1}\times Risk_{it-1}\times\Delta R_t$										0.0316**		
$Cap_{it-1}\times Risk_{it-1}\times\Delta R_{t-1}$										0.0075		
Intercept	0.180	0.425	0.221	0.217	0.419	0.245	0.206	0.423	0.431	0.239	0.405	0.468
R-squared	0.109	0.116	0.032	0.030	0.190	0.115	0.095	0.111	0.121	0.028	0.191	0.199
Number of observations	243	243	243	241	243	243	241	243	241	241	241	195

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔRt = yearly change of the short-term interest rate; Size it-1 = log of total assets; Liqit-1= liquidity ratio; Cap it-1= to asset ratio and Risk it-1= return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA). Standard errors are robust yet are not depicted. The s ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table 4E: Estimates of Model.1 using bank data in Slovakia (2004-2013)

	Size	Liq	Cap	Risk	Size Liq	Size Cap	Size Risk	Liq Cap	Liq Risk	Cap Risk	Size Liq Cap Risk
Specification	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
ΔR_t	0.0106	0.0511	0.0633	0.0601	0.0091	0.0145	0.0046	0.0625	0.0698	0.0488	0.0106
ΔR_{t-1}	0.0286	0.0570	0.0379	0.0413	0.0452	0.0128	0.0223	0.0541*	0.0660	0.0253	0.0283
$GGDP_t$	0.7330	-0.6300	0.3710	0.2430	-0.2330	1.0520	0.6780	-0.3150	-0.8830	0.5680	0.4490
$GGDP_{t-1}$	0.5510	-0.1030	0.0972	0.1820	0.0080	0.1300	0.3700	-0.0558	-0.1310	0.1250	0.0170
CPI_t	-0.0016	0.0069	-0.0159	-0.0164	0.0288	0.0150	0.0042	-0.0063	0.0059	-0.0107	0.0316
CPI_{t-1}	-0.0215	-0.0172	0.0067	-0.0064	-0.0285	-0.0036	-0.0203	-0.0057	-0.0172	0.0093	-0.0097
$Size_{it-1}$	-0.412**				-0.427**	-0.455***	-0.431**				-0.493**
$Size_{it-1}\times\Delta R_t$	-0.0153				-0.0114	-0.0005	-0.0135				-0.0004
Liq_{it-1}		1.128*			1.279*			0.708*	1.217*		0.787*
$Liq_{it-1}\times\Delta R_t$		0.409*			0.383*			0.3100	0.535*		0.248*
Cap_{it-1}			-3.0630			-3.200*		-2.5600		-4.253*	-3.709*
$Cap_{it-1}\times\Delta R_t$			0.2580			1.333*		0.5640		0.3300	1.4460
$Risk_{it-1}$				-0.0049			-0.0059		-0.0039	0.0063	0.0053
$Risk_{it-1}\times\Delta R_t$				0.0001			0.0002		0.0009*	-0.0004	0.0000
$Size_{it-1}\times\Delta R_{t-1}$	-0.0123				-0.0069	-0.0037	-0.0086				-0.0026
$Liq_{it-1}\times\Delta R_{t-1}$		0.4680			0.4650			0.288*	0.5180		0.376**
$Cap_{it-1}\times\Delta R_{t-1}$			0.5560			0.2590		0.3370		0.1270	0.582*
$Risk_{it-1}\times\Delta R_{t-1}$				-0.0003			-0.0003		0.0003	-0.0005	0.0001
$Size_{it-1}\times Liq_{it-1}\times\Delta R_t$					0.0335						
$Size_{it-1}\times Liq_{it-1}\times\Delta R_{t-1}$					-0.0748						
$Size_{it-1}\times Cap_{it-1}\times\Delta R_t$						0.3430					
$Size_{it-1}\times Cap_{it-1}\times\Delta R_{t-1}$						-0.4980					
$Size_{it-1}\times Risk_{it-1}\times\Delta R_t$							0.0008				
$Size_{it-1}\times Risk_{it-1}\times\Delta R_{t-1}$							0.0006				
$Liq_{it-1}\times Cap_{it-1}\times\Delta R_t$								-6.3920			
$Liq_{it-1}\times Cap_{it-1}\times\Delta R_{t-1}$								4.5650			
$Liq_{it-1}\times Risk_{it-1}\times\Delta R_t$									0.0043		
$Liq_{it-1}\times Risk_{it-1}\times\Delta R_{t-1}$									0.0000		
$Cap_{it-1}\times Risk_{it-1}\times\Delta R_t$										-0.0171	
$Cap_{it-1}\times Risk_{it-1}\times\Delta R_{t-1}$										-0.0280	
Intercept	0.0938	0.228	0.104	0.159	0.161	-0.0156	0.0957	0.192	0.250	0.0361	0.0100
R-squared	0.362	0.296	0.351	0.197	0.455	0.553	0.380	0.399	0.270	0.349	0.581
Number of observations	80	80	80	79	80	80	79	80	79	79	79

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔR_t = yearly change of the short-term interest rate; $Size_{it-1}$ = log of total assets; Liq_{it-1} = liquidity ratio; Cap_{it-1} = capital to asset ratio and $Risk_{it-1}$ = return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA). Standard errors are robust yet are not depicted. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table 4F: Estimates of Model.1 using bank data in Slovenia (2004-2013)

	Size	Liq	Cap	Risk	Size Liq	Size Cap	Size Risk	Liq Cap	Liq Risk	Cap Risk	Size Liq Cap Risk
Specification	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
ΔR_t	-0.0032	0.0047	-0.0001	-0.0026	0.0079	0.0000	-0.0041	0.0073	0.0030	-0.0018	0.0139
ΔR_{t-1}	-0.0519**	-0.0453*	-0.0506*	-0.0512**	-0.0457*	-0.0512*	-0.0559**	-0.0419	-0.0457*	-0.0478*	-0.0456*
$GGDP_t$	0.6390	0.3690	0.5750	0.6180	0.3010	0.6080	0.6440	0.2770	0.3780	0.6570	0.1750
$GGDP_{t-1}$	3.896***	3.498**	3.751***	3.924***	3.509**	3.740***	3.929***	3.256**	3.556**	3.559***	3.176**
CPI_t	-0.0208	-0.0170	-0.0217	-0.0249	-0.0178	-0.0181	-0.0216	-0.0135	-0.0187	-0.0196	-0.0123
CPI_{t-1}	-0.0634**	-0.0555*	-0.060***	-0.066***	-0.0538*	-0.0590**	-0.0652**	-0.0481*	-0.0579*	-0.0591**	-0.0415*
$Size_{it-1}$	0.0500				-0.0144	0.0588	0.0544				0.0025
$Size_{it-1} \times \Delta R_t$	0.0012				-0.0001	-0.0050	0.0047				0.0072
Liq_{it-1}		0.3920			0.4090			0.4400	0.3910		0.5060
$Liq_{it-1} \times \Delta R_t$		-0.0176			-0.0012			0.0038	0.0180		0.1650
Cap_{it-1}			1.8420			1.8500		2.0800		2.2480	3.0720
$Cap_{it-1} \times \Delta R_t$			0.0743			0.0390		0.0868		0.3320	0.1780
$Risk_{it-1}$				0.0037			0.0035		0.0032	-0.0018	-0.0056
$Risk_{it-1} \times \Delta R_t$				0.0008**			0.0010		0.0008	0.0012*	0.0012*
$Size_{it-1} \times \Delta R_{t-1}$	-0.0125*				-0.0100	-0.0112	-0.0138*				-0.0075
$Liq_{it-1} \times \Delta R_{t-1}$		-0.0410			-0.0479			-0.0338	-0.0228		-0.0609
$Cap_{it-1} \times \Delta R_{t-1}$			-0.0962			-0.0710		-0.0397		-0.1030	-0.1380
$Risk_{it-1} \times \Delta R_{t-1}$				0.0008			-0.0001		0.0008*	0.0008	0.0006*
$Size_{it-1} \times Liq_{it-1} \times \Delta R_t$					-0.0292						
$Size_{it-1} \times Liq_{it-1} \times \Delta R_{t-1}$					-0.1530						
$Size_{it-1} \times Cap_{it-1} \times \Delta R_t$						-0.3610					
$Size_{it-1} \times Cap_{it-1} \times \Delta R_{t-1}$						0.0111					
$Size_{it-1} \times Risk_{it-1} \times \Delta R_t$							0.0000				
$Size_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$							-0.0011				
$Liq_{it-1} \times Cap_{it-1} \times \Delta R_t$								-1.6920			
$Liq_{it-1} \times Cap_{it-1} \times \Delta R_{t-1}$								3.2280			
$Liq_{it-1} \times Risk_{it-1} \times \Delta R_t$									-0.0075		
$Liq_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$									-0.0026		
$Cap_{it-1} \times Risk_{it-1} \times \Delta R_t$										0.0762	
$Cap_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$										0.0013	
Intercept	0.146	0.142*	0.151**	0.166**	0.141	0.134*	0.151	0.124*	0.149*	0.146*	0.110
R-squared	0.689	0.696	0.698	0.690	0.693	0.697	0.692	0.713	0.698	0.705	0.730
Number of observations	119	119	119	119	119	119	119	119	119	119	119

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔRt = yearly change of the short-term interest rate; Size it-1 = log of total assets; Liqit-1= liquidity ratio; Cap it-1= capital to asset ratio and Risk it-1= return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA). Standard errors are robust yet are not depicted. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

In keeping with the methods described in Barth *et al.* (2004), a regulation variable (*REG*) was adopted into the model which considers the extent to which banks are allowed to engage in securities, insurance and real estate activities. The data shows a negative value for the regulation variable, corroborating the notion that banks reduced lending specifically in Baltic States in which particular institutional components facilitated their additional influence within non-traditional banking activities. However, the empirical model is largely measured using national data in the case of the Czech Republic, Hungary, Poland, Slovakia and Slovenia, as a result the cross-country-difference issue is not applicable. Due to the small number of observation per country, it would be not feasible to make comparative analyses among Baltic States with respect to pre-and post-euro adoption.

Additionally, foreign banks are differentiated according to their interpretation by the Bankscope which characterises them as possessing unmediated or complete participation in excess of 50%. As a result of the inadequate instances of observations in Baltic States, Slovakia and Slovenia, performing a correlation study was not possible at this point, as demonstrated in the Czech Republic, Poland and Hungary; for the most part the coefficients were not significantly different from the main findings and the deduction resulting from this research. As a result the primary discussion remains intact.

2.5.2 The impact of bank competition on the BLC

The Lerner index is added to the first column and correspondingly the interaction terms of monetary policy are restricted to the connections specific to the index with the purpose of determining its value. In the next column four main bank-specific traits are added: size, capital, liquidity and risk. Additionally, the final column evaluates the interaction term for the previously mentioned characteristic along with the Lerner index (see Tables 5A-5B).

The interaction terms between the Lerner index and monetary policy, and its impact on the supply of loan, indicate a negative and statistically significant correlation amongst Baltic States, the Czech Republic, Poland and Slovenia.

A negative coefficient suggests that monetary policy has a greater effect in a background of imperfect markets. Specifically, by contracting the monetary policy indicator, the monetary officials are likely to successfully reduce the supply of bank loans within a banking market with reduced competition; this prediction is supported by Amidu and Wolfe (2013) which offer results corroborating the likelihood of a greater correlation between market imperfection and the effectiveness of the monetary policy. Yet, these results contradict those yielded in examinations of the euro area countries such as in Leory (2014) and Fungáčová *et al*. (2014).

Table 5A: Main estimations, including Lerner index (2004-2013)

	Baltic States			Czech Republic			Hungary		
Specification	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
ΔR_t	0.0016	0.0103	0.0056	-0.1220	-0.1250	-0.158*	-0.1110	0.2800	0.2930
ΔR_{t-1}	0.0092	0.0143	0.0112	0.326*	0.348*	0.369**	-0.0401	0.0393	0.0428
$GGDP_t$	2.062***	1.412***	1.319***	1.570**	1.487**	1.732**	0.3720	4.1000	4.0780
$GGDP_{t-1}$	0.0464	0.2080	0.3350	-0.5710	-0.6660	-0.6900	1.6830	-5.9020	-6.9000
CPI_t	-0.0204*	-0.025***	-0.025***	-0.0548*	-0.0577**	-0.0601**	0.0959	-0.2800	-0.2840
CPI_{t-1}	0.0451***	0.0100	0.0066	-0.125*	-0.133*	-0.140**	0.0007	0.138**	0.160**
$Size_{it-1}$		-0.591**	-0.621***		-0.0304	-0.0010		-0.999**	-1.131**
$Size_{it-1} \times \Delta R_t$			0.0046			0.0030			0.0101
Liq_{it-1}		0.784*	0.763*		-0.0478	-0.0208		2.669**	2.201**
$Liq_{it-1} \times \Delta R_t$			0.0359			-0.331*			-0.0529
Cap_{it-1}		-2.3060	-2.7610		0.9360	0.9280		-7.0830	-8.3710
$Cap_{it-1} \times \Delta R_t$			-0.0534			-0.3840			-0.8400
$Risk_{it-1}$		0.0016	0.0005		-0.0040	-0.0010		0.0514	0.0615
$Risk_{it-1} \times \Delta R_t$			-0.0018			0.0014			0.0018
Lerner $Index_{it-1}$	0.336*	0.2160	0.2260	-0.1430	-0.0341	-0.1170	-0.8250	-0.4710	-0.7470
Lerner $Index_{it-1} * \Delta R_t$	-0.0308	-0.0730*	-0.0572	-0.2700	-0.2600	-0.211*	0.0034	-0.2090	-0.0200
$Size_{it-1} \times \Delta R_{t-1}$			0.0046			0.0027			-0.0035
$Liq_{it-1} \times \Delta R_{t-1}$			-0.0400			-0.0468			0.2250
$Cap_{it-1} \times \Delta R_{t-1}$			0.1980			0.3490			-0.3150
$Risk_{it-1} \times \Delta R_{t-1}$			-0.0006			-0.0005			0.0014
Lerner $Index_{it-1} \times \Delta R_{t-1}$	0.0174	-0.0194	-0.0237	0.0423	0.0344	0.0357	0.0856	0.0206	0.0140
Intercept	-0.154*	0.186	0.203	0.579*	0.637**	0.645**	-0.460	1.416	1.393
R-squared	0.355	0.625	0.677	0.325	0.307	0.394	0.030	0.442	0.456
Number of observations	223	217	217	124	124	124	122	119	119

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔR_t = yearly change of the short-term interest rate; $Size_{it-1}$ = log of total assets; Liq_{it-1} = liquidity ratio; Cap_{it-1} = capital to asset ratio, $Risk_{it-1}$ = return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA) and Lerner $index_{it-1}$ is determined as the proportion of the remainder between price of output and marginal cost to the price Standard errors are robust yet are not depicted. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table 5B: Main estimations, including Lerner index (2004-2013)

	Poland			Slovakia			Slovenia		
Specification	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
ΔR_t	-0.0565	0.0869	0.0394	0.0507	-0.0010	0.0003	-0.0161	0.0174	0.0201
ΔR_{t-1}	0.131*	-0.0383	0.0063	0.0513	0.0126	0.0321	-0.0391	-0.0389	-0.0390
$GGDP_t$	1.7830	-0.2970	-0.0062	0.3250	1.0060	0.6140	1.0750	0.1770	0.2180
$GGDP_{t-1}$	-0.2880	0.1720	-0.3940	0.3400	0.0705	-0.0779	3.429**	3.137**	3.095*
CPI_t	0.0269	-0.0663	-0.0344	-0.0243	0.0120	0.0330	-0.0233	-0.0135	-0.0153
CPI_{t-1}	-0.0725	0.0638	-0.0065	-0.0178	-0.0051	-0.0171	-0.0631**	-0.0427*	-0.0372
$Size_{it-1}$		-0.586*	-0.606*		-0.465**	-0.534**		-0.0118	-0.0238
$Size_{it-1} \times \Delta R_t$			0.0061			0.0252			0.0034
Liq_{it-1}		0.4500	0.3780		0.1690	0.7010		0.5460	0.4830
$Liq_{it-1} \times \Delta R_t$			-0.547***			0.319**			0.0457
Cap_{it-1}		-5.7080	-4.8780		-3.902*	-3.6250		3.508*	3.464*
$Cap_{it-1} \times \Delta R_t$			-0.0979			1.5560			0.311*
$Risk_{it-1}$		0.0035	-0.0020		0.0027	0.0038		-0.0075	-0.0068
$Risk_{it-1} \times \Delta R_t$			-0.0010			0.0002			0.0007
Lerner $Index_{it-1}$	-0.4700	0.0895	0.1870	-0.5320	0.2030	0.1080	0.1270	-0.1150	-0.1390
Lerner $Index_{it-1} * \Delta R_t$	-0.364*	-0.3260	-0.3310	-0.1070	-0.0872	-0.2490	-0.1150	-0.1290	-0.1550
$Size_{it-1} \times \Delta R_{t-1}$			-0.0069			-0.0011			-0.0060
$Liq_{it-1} \times \Delta R_{t-1}$			0.0900			0.384**			-0.154*
$Cap_{it-1} \times \Delta R_{t-1}$			-0.3780			0.518*			0.2240
$Risk_{it-1} \times \Delta R_{t-1}$			-0.0004			0.0000			0.0002
Lerner $Index_{it-1} \times \Delta R_{t-1}$	-0.0739	-0.0293	-0.0095	-0.1810	-0.0429	0.0088	-0.0779	-0.0983*	-0.161**
Intercept	0.217	0.296	0.451	0.203	-0.003	0.017	0.152*	0.122	0.113
R-squared	0.068	0.156	0.216	0.271	0.534	0.577	0.683	0.720	0.719
Number of observations	199	198	198	80	79	79	113	113	113

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔR_t = yearly change of the short-term interest rate; $Size_{it-1}$ = log of total assets; Liq_{it-1}= liquidity ratio; Cap_{it-1}= capital to asset ratio, $Risk_{it-1}$= return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA) and Lerner $index_{it-1}$= is determined as the proportion of the remainder between price of output and marginal cost to the price Standard errors are robust yet are not depicted. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

2.5.3 The impact of the financial crisis

In keeping with the deductions and inferences made in the available theoretical models about the BLC, the impact of bank size, liquidity, capital and risk on bank-sourced lending should conceivably bear positive coefficients; this means that large, highly liquid banks, well-capitalised and low risk banks should be less likely to change their credit portfolio, especially in the instance of a banking crisis and consequently to monetary policy stance changes.

Yet, as our model tailored for the period of 2008-2011 implies, said coefficients are ultimately not significant; this conclusion serves as an additional refutation of the role of said indicators in allowing banks to maintain lending activity and growth during a financial crisis, which apparently does not include the positive interaction term of bank liquidity with interest rates in the case of Slovakia (see Table 6A-6C). The data shows that bank liquidity is a crucial differentiating factor in the reaction of banks to changes in the monetary policy in Slovakia most notably during the financial crisis. The monetary policy makers reacted to the Global Financial Crisis (GFC) by slashing interest rates to nearly zero and keeping them there for a record duration of time with the purpose of enabling bank lending activity. Under these circumstances Keynes (1936) characterise monetary policy as similar to *'pushing and string'* while also presenting the idea of a '*liquidity trap'*. With the intention of increasing the rate of economic recovery, the central banks have introduced several unconventional monetary policy practices coined '*non-standard policy measures'*, *'quantitative easing'* and '*credit easing*'. When examining the aim of the ECB, Cour-Thimann and Winkler (2013) highlight that the central bank employs non-standard measures that act as a complement to the standard interest rate policy rather than as a replacement for it. Such measures have served to enhance credit flows and financing conditions because they are geared at assisting the effective diffusion

of interest rate policies throughout the euro area at a time when other policies and developments have proved ineffective in several areas of Europe's financial sector. As stressed in Mullineux (2013), the central banks' practice of offering an elastic supply of liquidity could therefore be similar to '*pushing on a string'*; yet, in order to sufficiently stimulate the economy, banks need to begin lending idle cash to investment firms utilising this capital.

As reflected in the model specific for the crisis, the growth of bank lending in response to the monetary policy stance derived from money market rates in the short term is not significant yet again in most cases. Considering substantially reduced monetary policy rates within the crisis period, an inverse correlation between interest rates and bank lending growth would be predicted; yet, this assumption is unsupported by the estimated data. In contrast to the theoretical justification for the money channel, which endorses a concept of an indirect relationship between bank lending growth and monetary policy stance, in the model that evaluates the period of the crisis it is suggested that an unanticipated positive relation exists in Slovenia possibly a consequence of a '*pushing on a string effect'.*

What this really highlights is that notwithstanding the labours of the national central banks to keep interest rates low and inject liquidity into their economic systems, bank lending has stayed subdued. This result can be correlated with that seen when examining the critical investigation of the Japanese economy in Werner (2012) which highlights that continuous interest rate reductions for a period spanning over a decade were unsuccessful at stimulating the economy and expanding the money supply. The estimations made here indicate that the prevalence of BLC was reduced throughout the credit crisis. The influence of the financial crisis is thought to have been more distinct for the credit supply than for the credit demand. Here it is suggested that the effectiveness of monetary policy

has been reduced during this period for a variety of reasons, such as bank aversion to increase lending activity and volume irrespective of the monetary policy stance.

2.5.4 Extensions and robustness tests

In addition this study also assesses unconventional monetary policy by introducing a further proxy corresponding the ratio between each central bank's total assets and nominal GDP for the crisis sample.[21] The previously addressed proxy suggests a similar effect as these measures seem to be ineffective in covering reduced lending activity by banks following the aftermath of financial turmoil. It is important to mention that the ratio has a predicted negative sign when included in the model specific for the crisis sample, which is in contrast to a recent study conducted in Fungáčová *et al.* (2014) and Gambacorta and Marques-Ibanez (2011) in which the direct positive relation was determined for the euro area and more industrialised countries.

The ultimate robustness check includes assessing the possible modifications to the BLC in EU-8 via pooling data, which is accomplished through amending the records to a unified currency, the euro. Stated in other terms, this study determines whether combined bank coefficients for EU-8 '*club*' may vary with the primary inference derived from this study. The outcomes documented in Appendix C indicate for the most part, particularly during the financial crisis period, that the coefficients were not significantly different for EU-8 '*club*' and the deduction resulting from this study. As a result the primary conclusions remain intact.

[21] The data for constructing this proxy were taken from Bankscope and Eurostat which consists of the following central banks: the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia and Slovenia.

Table 6A: Regression results: Crisis effects (2008-11)

	Baltic States						Czech Republic					
Specification	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
ΔR_{t-1}	0.0431	0.0730*	0.0660*	0.0720**	0.0722*	0.007	0.111	0.090	0.076	0.108	0.067	0.105
ΔR_{t-1}*C	-0.034	-0.0635*	-0.0583*	-0.0642*	-0.0628*	-0.001	-0.109	-0.088	-0.065	-0.108	-0.057	-0.102
Central bank assets/GDP $_{t-1}$	-0.850***	-0.687***	-0.699***	-0.681***	-0.801***	-0.917***	-0.184	-0.070	-0.122	-0.112	-0.121	-0.252
$GGDP_{t-1}$	0.434**	0.542**	0.652***	0.592***	0.553***	0.327*	0.405	0.759**	0.784**	0.847**	0.669**	0.362
CPI_{t-1}	-0.0175*	-0.005	-0.0069*	-0.007	-0.007	-0.018**	-0.015	-0.0296*	-0.030	-0.030	-0.027	-0.011
Size $_{it-1}$	-0.443*					-0.66***	-0.164*					-0.098
Size $_{it-1}$*C	0.009					0.040	-0.025					-0.045
Size $_{it-1}\times\Delta R_{t-1}$	0.022					0.034	0.041					0.136***
Size $_{it-1}\times\Delta R_{t-1}$*C	-0.021					-0.030	-0.029					-0.141**
Liq_{it-1}		0.235				0.807*		-0.217				-0.326
Liq_{it-1}*C		0.165				-0.004		0.500				0.372
Liq $_{it-1}\times\Delta R_{t-1}$		0.049				0.329*		-1.210*				-1.74***
Liq $_{it-1}\times\Delta R_{t-1}$*C		-0.057				-0.386**		1.020				1.730***
Cap $_{it-1}$			0.493			-2.930			0.278			2.950
Cap $_{it-1}$*C			1.615			1.766			0.253			-1.064
Cap $_{it-1}\times\Delta R_{t-1}$			0.457			0.472			-0.821			3.368
Cap $_{it-1}\times\Delta R_{t-1}$*C			-0.221			-0.161			0.638			-3.256
Risk $_{it-1}$				0.007		-0.012				0.002		-0.010
Risk $_{it-1}$*C				0.012		0.008				-0.001		0.000
Risk $_{it-1}\times\Delta R_{t-1}$				-0.002		-0.0077*				0.002		-0.003
Risk $_{it-1}\times\Delta R_{t-1}$*C				0.002		0.0078*				-0.002		0.003
Lerner Index it-1					0.548**	0.456*					-0.307	-0.275
Lerner Index it-1*C					-0.207	-0.216					0.149	0.363*
Lerner Index it-1*ΔRt-1					-0.194	-0.197					-0.004	-0.618
Lerner Index it-1*ΔRt-1*C					0.212	0.174					0.058	0.682
Intercept	0.280***	0.192***	0.191***	0.200***	0.212***	0.399***	0.183**	0.174**	0.179**	0.174**	0.168**	0.211**
R-squared	0.419	0.170	0.220	0.201	0.244	0.624	0.258	0.229	0.217	0.128	0.181	0.283
Number of observations	231	231	231	225	223	217	130	130	130	130	124	124

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔR_t = yearly change of the short-term interest rate; Size $_{it-1}$ = log of total assets; Liq_{it-1}= liquidity ratio; Cap $_{it-1}$= capital to asset ratio, Risk $_{it-1}$= return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA) and Lerner index $_{it-1}$= is determined as the proportion of the remainder between price of output and marginal cost to the price Standard errors are robust yet are not depicted. C= dummy crisis. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table 6B: Regression results: Crisis effects (2008-11)

	Hungary						Poland					
Specification	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
ΔR_{t-1}	0.0003	-0.030	-0.015	-0.012	-0.018	0.011	0.071	0.176	0.120	0.127	0.203*	0.171
ΔR_{t-1}*C	-0.104	-0.027	-0.036	-0.003	-0.018	-0.158	-0.096	-0.105	-0.075	-0.083	-0.124	-0.166
Central bank assets/GDP $_{t-1}$	-0.778*	-0.056	-0.546	-0.387	-0.522***	0.006	0.293	0.333	0.542	0.568	0.542	-0.099
$GGDP_{t-1}$	-1.441**	-0.75*	-0.280	-0.382	-0.390	-2.903*	0.007	-0.769	-0.451	-0.414	-0.743	-0.656
CPI_{t-1}	0.0511*	0.058*	0.026	0.031*	0.001	0.149*	-0.088	-0.19***	-0.17***	-0.17***	-0.21***	-0.110
Size $_{it-1}$	-0.785**					-1.309*	-0.394*					-0.583*
Size $_{it-1}$*C	0.077					0.040	0.026					-0.001
Size $_{it-1}\times\Delta R_{t-1}$	-0.006					0.005	0.009					0.040
Size $_{it-1}\times\Delta R_{t-1}$*C	0.021					0.040	-0.009					-0.059
Liq_{it-1}		3.199*				3.434**		1.353*				1.598**
Liq_{it-1}*C		0.145				-0.938		-1.448*				-1.82***
Liq $_{it-1}\times\Delta R_{t-1}$		0.191				0.322		1.148**				1.045*
Liq $_{it-1}\times\Delta R_{t-1}$*C		-0.434				-0.482		-1.24***				-1.149**
Cap $_{it-1}$			0.660			-6.016			1.200			-4.451
Cap $_{it-1}$*C			1.845			-4.428			-0.741			1.793
Cap $_{it-1}\times\Delta R_{t-1}$			0.057			0.897			-0.313			0.424
Cap $_{it-1}\times\Delta R_{t-1}$*C			-0.208			-2.411			0.258			-1.148
Risk $_{it-1}$				0.025		0.046				0.003		-0.006
Risk $_{it-1}$*C				0.008		0.022				-0.001		0.000
Risk $_{it-1}\times\Delta R_{t-1}$				0.000		-0.001				0.000		-0.001
Risk $_{it-1}\times\Delta R_{t-1}$*C				0.006		0.006				0.000		0.001
Lerner Index it-1					-0.838	-0.320					-0.167	-0.047
Lerner Index it-1*C					0.668	0.836					-0.421	-0.140
Lerner Index it-1*ΔRt-1					0.056	0.292					-0.536	-1.021*
Lerner Index it-1*ΔRt-1*C					0.260	0.143					0.605	1.204*
Intercept	0.060	-0.177	0.073	0.051	0.171	0.023	0.451	0.831***	0.729**	0.711**	0.859**	0.724*
R-squared	0.197	0.308	0.003	0.043	0.028	0.501	0.112	0.175	0.025	0.023	0.044	0.273
Number of observations	140	140	140	136	122	119	243	243	243	241	199	198

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, $\Delta R_{t=}$ yearly change of the short-term interest rate; Size $_{it-1=}$ log of total assets; $Liq_{it-1=}$ liquidity ratio; Cap $_{it-1=}$ capital to asset ratio, Risk $_{it-1=}$ return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA) and Lerner index $_{it-1=}$ is determined as the proportion of the remainder between price of output and marginal cost to the price Standard errors are robust yet are not depicted. C= dummy crisis. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table 6C: Regression results: Crisis effects (2008-11)

	Slovakia						Slovenia					
Specification	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
ΔR_{t-1}	0.0597**	0.0835***	0.0597*	0.0615*	0.0707*	0.0824*	-0.170*	-0.142	-0.167*	-0.184*	-0.188*	-0.095
ΔR_{t-1}*C	-0.033	0.036	-0.005	-0.009	-0.032	-0.029	0.122	0.105	0.122*	0.139	0.148*	0.067
Central bank assets/GDP_{t-1}	-0.284**	-0.369**	-0.429*	-0.378**	-0.313*	-0.385	0.316	0.284	0.317	0.383	0.371	0.120
$GGDP_{t-1}$	0.517	-1.235	-0.420	-0.375	0.047	-0.329	4.547***	3.965***	4.326***	4.539***	4.466***	3.277**
CPI_{t-1}	-0.041	-0.054	-0.0316*	-0.0390*	-0.037	-0.038	-0.082***	-0.075**	-0.079***	-0.08***	-0.08***	-0.0643*
Size $_{it-1}$	-0.376*					-0.358*	0.050					-0.062
Size $_{it-1}$*C	-0.006					0.024	0.001					-0.008
Size $_{it-1}\times\Delta R_{t-1}$	0.002					-0.018	-0.013					0.006
Size $_{it-1}\times\Delta R_{t-1}$*C	-0.023					0.046	0.000					-0.013
Liq_{it-1}		0.899*				0.568		0.391				0.587
Liq_{it-1}*C		0.042				-0.151		0.219				-0.266
Liq $_{it-1}\times\Delta R_{t-1}$		-0.083				-0.155		0.010				-0.024
Liq $_{it-1}\times\Delta R_{t-1}$*C		0.543*				0.268		-0.031				-0.196
Cap $_{it-1}$			-3.187**			-2.551			1.879			4.204*
Cap $_{it-1}$*C			0.362			-0.645			-0.192			-0.911
Cap $_{it-1}\times\Delta R_{t-1}$			0.403			-0.030			-0.129			0.654
Cap $_{it-1}\times\Delta R_{t-1}$*C			0.380			1.089			0.015			-0.600
Risk $_{it-1}$				-0.006		0.002				0.004		-0.011
Risk $_{it-1}$*C				0.000		0.000				-0.002		-0.002
Risk $_{it-1}\times\Delta R_{t-1}$				0.000		0.000				0.000		0.000
Risk $_{it-1}\times\Delta R_{t-1}$*C				-0.001		-0.001				0.001		0.001
Lerner Index it-1					-0.538	-0.071					0.088	-0.157
Lerner Index it-1*C					-0.229	-0.174					0.005	0.144
Lerner Index it-1*ΔRt-1					0.006	0.105					-0.185	-0.139
Lerner Index it-1*ΔRt-1*C					-0.294	-0.273					0.124	0.005
Intercept	0.252*	0.480*	0.311*	0.333***	0.283**	0.326*	0.080*	0.095*	0.083*	0.077*	0.079*	0.116**
R-squared	0.264	0.230	0.286	0.143	0.249	0.411	0.690	0.699	0.699	0.692	0.677	0.703
Number of observations	80	80	80	79	80	79	119	119	119	119	113	113

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔRt = yearly change of the short-term interest rate; Size it-1 = log of total assets; Liqit-1= liquidity ratio; Cap it-1= capital to asset ratio, Risk it-1= return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA) and Lerner index it-1= is determined as the proportion of the remainder between price of output and marginal cost to the price Standard errors are robust yet are not depicted. C= dummy crisis. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

2.6 Conclusion

In this chapter, we explore the role of the banks with respect to the MTM, specifically by examining the 8 accession countries which became members of the EU in accordance with the pact stated in the Treaty of Accession from 2004 to 2013. This approach is in contrast to prior research by Matousek and Sarantis (2009) which used a reference panel of similar countries, covering the decade preceding the accession (1994-2003). The data indicates that the BLC has experienced an evolved development over the period in EU-8, considering the time frame in this research.

The existence of the BLC is demonstrated via capitalisation which appears to be a significant, contributing bank-specific characteristic when evaluating the banks' response to monetary policy changes in the Czech Republic, Baltic States, Poland, and Slovakia. Furthermore, the coefficient on bank size is determined to be statistically insignificant for EU-8. Therefore, the matter of informational asymmetry is not vital in the BLC for EU-8. Additionally, the results reveal that bank risk is a crucial differentiating factor in the reaction of banks to changes in the monetary policy stance within the EU-8 countries. It is determined that the remaining bank-specific traits appear to be irrelevant considerations when evaluating the response of banks to changes in monetary policy for the total duration of this study.

The model used in this study is constructed to consider any distinct movement on banks' lending behaviour for the period of financial turmoil. Revealing the fact that bank characteristics can change the strength of the BLC. From 2008 to 2011, the BLC of monetary policy is impaired, which serving as an additional refutation of the role of said indicators in allowing banks to maintain lending activity and growth during a financial crisis.

This study proposes that the effectiveness of monetary policy has been reduced throughout the credit crisis for different reasons, such as bank aversion to increase lending activity and volume irrespective of the monetary policy stance.

The inference drawn from a negative coefficient for the Lerner index is that monetary policy shows greater efficiency in a background of imperfect markets. In line with the analysis of 55 developing countries carried out by Amidu and Wolfe (2013), the results of this study corroborate the notion of a greater correlation between market imperfection and the effectiveness of the monetary policy; however, this outcome contradicts the conclusions drawn following research conducted by Leory (2014) and Fungáčová *et al*. (2014) concerning the Eurozone countries.

Moreover, this study supports the introduction of regulatory capital requirements and suggests that this would not cause reduced lending. Bank capital and liquidity have plausible positive and significant effects on bank loan growth, during the course of the investigation 2004-2013. Accordingly, it is advised that banks fulfil the standards set by these regulations and requirements. In addition, the shadow banking system must also be monitored as a result of more potentially dangerous components native to this system, reinforcing the idea of having regulation procedures that are a good fit with its complementary financial institution.

This study recommends widespread data availability on the entire banking system, including more detail. Measurement by tier-1 capital ratio would be particularly useful as it would permit subsequent research to perform a detailed evaluation of the monetary policy transmission mechanism since it considers additional parameters.

Appendices to Chapter 2

Appendix A

Table A1: Description of variables used in the regressions

Variable	Description	Calculation	Sources
ΔL	Gross Loan	The difference of the natural logarithm of loans	Bankscope
S	Size	Log of total assets	Bankscope
CAP	Capital to asset ratio	Total equity/ Total assets	Bankscope
LIQ	Liquidity ratio	Cash, trading securities and interbank lending of maturities less than three months / Total assets	Bankscope
Risk	Z-score (risk)	Return on assets (ROA) + equity capital to assets ratio (CAR)/ standard deviation of return on assets (SDROA).	Bankscope
ΔR	Short-term interest rates	Annual change in the money market rates on deposit with 3 months maturity	Eurostat
TC	Total costs	Total of personnel expenses, other non-interest expenses and interest paid	Bankscope
Y	Total assets	Total assets	Bankscope
W1	Price of labour	Personnel expenses to total assets	Bankscope
W2	Price of P-capital	Non-interest expenses to fixed assets	Bankscope
W3	Price of B-funds	Ratio of interest expenses to deposits and short-term funding	Bankscope
$\Delta ln\ GGDP$	GDP growth	Growth rate of nominal GDP	Eurostat
ΔCPI	CPI	Growth rate of harmonised indices of consumer prices	Eurostat
NSPM	Non-standard policy measures	Central bank's total assets/ nominal GDP	Bankscope Eurostat
Tier-1	Tier1-capital	Core equity capital/ risk-weighted assets	Bankscope
NPLs	NPLs ratio	Non-performing loans / gross loan	Bankscope
LLPs	LLPs ratio	Loan loss provision / gross loan	Bankscope
REG	Regulation	The extent to which banks are allowed to engage in securities, insurance and real estate activities	Barth *et al*. (2004)

Table A2: Summary statistics

Variable	Obs.	Mean	Std.Dev.	Min.	Max.
Baltic States					
Δln (Loans)	254	0.154	0.389	-1.047	3.183
Size	254	13.556	1.546	8.958	17.067
Capitalisation	254	0.099	0.074	-0.705	0.376
Liquidity	254	0.31	0.205	0.006	0.997
Risk factor	254	8.265	9.04	-7.871	66.742
Lerner index	254	-0.026	0.211	-0.896	0.524
ΔR	254	-0.345	3.445	-11.1	5.09
GDP growth	254	0.074	0.13	-0.261	0.272
CPI	254	3.92	3.138	-1.2	15.3
Czech Republic					
Δln (Loans)	141	0.136	0.203	-0.253	1.077
Size	141	18.369	1.421	13.327	20.691
Capitalisation	141	0.101	0.104	0.005	0.987
Liquidity	141	0.239	0.171	0	0.838
Risk factor	141	30.559	19.341	0.172	78.748
Lerner index	141	0.103	0.301	-1.824	0.441
ΔR	141	-0.211	0.81	-1.85	0.94
GDP growth	141	0.055	0.077	-0.082	0.154
CPI	141	2.44	1.53	0.6	6.3
Hungary					
Δln (Loans)	155	0.097	0.486	-3.872	2.963
Size	155	19.6	1.924	15.809	23.063
Capitalisation	155	0.122	0.083	0.002	0.481
Liquidity	155	0.209	0.192	0.003	0.978
Risk factor	155	16.774	25.23	-1.649	173.598
Lerner index	155	0.063	0.202	-0.579	0.658
ΔR	155	-0.817	2.243	-4.83	1.48
GDP growth	155	0.021	0.067	-0.138	0.106
CPI	155	4.82	1.714	1.7	7.9

Table A2: Summary statistics

Variable	Obs.	Mean	Std.Dev.	Min.	Max.
Poland					
Δln (Loans)	264	0.146	0.361	-1.75	3.763
Size	264	15.855	1.696	10.688	19.11
Capitalisation	264	0.12	0.079	0.033	0.918
Liquidity	264	0.17	0.161	0	0.873
Risk factor	264	28.149	26.66	-16.268	156.768
Lerner index	264	0	0.395	-1.75	0.721
ΔR	264	-0.354	1.152	-1.94	1.62
GDP growth	264	0.073	0.095	-0.145	0.178
CPI	264	2.9	1.124	0.8	4.2
Slovakia					
Δln (Loans)	87	0.112	0.16	-0.371	0.83
Size	87	14.475	1.353	12.051	16.346
Capitalisation	87	0.091	0.073	-0.002	0.699
Liquidity	87	0.18	0.131	0.02	0.63
Risk factor	87	26.791	29.671	-1.212	144.598
Lerner index	87	0.077	0.187	-0.529	0.406
ΔR	87	-0.462	1.131	-2.63	1.44
GDP growth	87	0.084	0.075	-0.031	0.212
CPI	87	3.13	1.942	0.7	7.5
Slovenia					
Δln (Loans)	128	0.087	0.162	-0.359	0.597
Size	128	14.313	0.972	11.377	16.791
Capitalisation	128	0.083	0.038	0.011	0.244
Liquidity	128	0.12	0.088	0.01	0.429
Risk factor	128	9.828	12.346	-3.078	56.516
Lerner index	128	0.217	0.155	-0.882	0.654
ΔR	128	-0.493	1.156	-3.41	0.7
GDP growth	128	0.029	0.05	-0.048	0.108
CPI	128	2.78	1.215	0.9	5.5

Appendix B

Table B1: A synopsis of the predicted signs of coefficients

Variable	Expected sing	Hypothetical Outlook [22]
$Size_{it-1}$	+/-	Large banks may be less vulnerable to dramatic changes in monetary policy (+). Smaller banks could have more variable lending activity if newly founded, relative to the larger banks. Additionally, a healthy lending relationship between small banks and firms could be a possibility (-)
$Size_{it-1}*C$	+/-	Too big to fail (+) / Too big to be bailed out (-)
CAP_{it-1}	+	Banks that are well-capitalised banks tend to increase the loan supply
$CAP_{it-1}*C$	+	Especially during the period of the financial crisis
LIQ_{it-1}	+	Banks with higher liquidity are expected to increase their loan supply
$LIQ_{it-1}*C$	+	Especially during the period of the financial crisis
$Risk_{it-1}$	+/-	Bank loan portfolios that are low risk are not as vulnerable if mandated by regulation from capital markets (+) Banks with higher risk could increase their lending activity (-)
$Risk_{it-1}*C$	+	During the period of the financial crisis, banks with less risk are not particularly disposed to decrease their lending activity relative to the opposite side of the spectrum
ΔR_t	-	Tight monetary policy results in decreased lending activity (-)
$\Delta R_{t-1}*C$	+/-	During the period of the financial crisis a "*pushing on a string effect*" could occur (+); this effect could be augmented (-)
$GGDP_t$	+	Favourable economic conditions are conducive to expanded loan supply by banks
CPI_t	+/-	Inflation levels could have a favourable impact on the growth of nominal loans (+). Inflation rates could have the opposite effect on these loans (-)
The bank lending channel (BLC) postulation: The 2-way and 3-way interaction between bank characteristics and the monetary policy measurement		
$Size_{it-1}* \Delta$Rt	+	Larger banks are predicted to resist the changes in monetary policy
$Size_{it-1}* \Delta R_{t-1}*C$	+	Especially during the period of the financial crisis
$CAP_{it-1}* \Delta$Rt	+	Well-capitalised banks are predicted to resist the changes in monetary policy
$CAP_{it-1}* \Delta R_{t-1}*C$	+	Especially during the period of the financial crisis
$LIQ_{it-1}* \Delta$Rt	+	Highly liquid banks are predicted to resist the changes in monetary policy
$LIQ_{it-1}* \Delta R_{t-1}*C$	+	Especially during the period of the financial crisis
$Risk_{it-1}* \Delta$Rt	+	Low risk banks are less sensitive to monetary policy changes
$Risk_{it-1}* \Delta R_{t-1}*C$	+	Especially during the period of the financial crisis
$Size_{it-1}* CAP_{it-1}* \Delta$Rt	+	Large banks that are well-capitalised are predicted to resist the changes in monetary policy
$Size_{it-1}* CAP_{it-1}* \Delta R_{t-1}*C$	+	Especially during the period of the financial crisis
$Size_{it-1}* LIQ_{it-1}* \Delta$Rt	+	Large banks with high liquidity are predicted to resist the changes in monetary policy

[22] The hypothetical foundation of the assertion stated in this segment is sourced from empirically supported research (Gambacorta, 2005; Matousek & Sarantis, 2009; Altunbas, *et al*., 2010; Gambacorta and Marques-Ibanez, 2011 and Akinci *et al*., 2013; among others).

$Size_{it-1}$*LIQ_{it-1}* ΔR_{t-1}*C	+	Especially during the period of the financial crisis
$Size_{it-1}$* $Risk_{it-1}$* ΔRt	+	Large banks with low risk are less sensitive to monetary policy changes
$Size_{it-1}$*$Risk_{it-1}$* ΔR_{t-1}*C	+	Especially during the period of the financial crisis
CAP_{it-1}* LIQ_{it-1}* ΔRt	+	Banks with high liquidity that are well-capitalised are predicted to resist the changes in monetary policy
CAP_{it-1}* LIQ_{it-1}* ΔR_{t-1}*C	+	Especially during the period of the financial crisis
CAP_{it-1}* $RISK_{it-1}$* ΔRt	+	Well capitalised and low risk banks are less sensitive to monetary policy changes
CAP_{it-1}* $RISK_{it-1}$* ΔR_{t-1}*C	+	Especially during the period of the financial crisis
LIQ_{it-1}* $RISK_{it-1}$* ΔRt	+	Liquid and low risk banks are less sensitive to monetary policy changes
LIQ_{it-1}* $RISK_{it-1}$* ΔR_{t-1}*C	+	Especially during the period of the financial crisis
Notes: The sample for this study spans from 2004 to 2013. The signs + (-), ++ (--), +++ (---) indicate significance of a statistic at the 10 percent, 5 percent and 1 percent level, correspondingly. C denotes the period of financial crisis.		

Table B2: Correlation matrix

	$\Delta \ln(L)$	ΔR	Size	Liquidity	Capital	Tier 1	Risk	Lerner	REG
$\Delta \ln(L)$	1.0000								
ΔR	0.0349	1.0000							
	0.2786								
Size	-0.1678	0.0074	1.0000						
	0.0000	*0.8005*							
Liquidity	0.2229	-0.0256	-0.3253	1.0000					
	0.0000	*0.3831*	*0.0000*						
Capital	0.1597	-0.0230	-0.2716	0.1021	1.0000				
	0.0000	*0.4333*	*0.0000*	*0.0003*					
Tier 1	0.1481	-0.0275	-0.2514	0.1950	0.8879	1.0000			
	0.0030	*0.5713*	*0.0000*	*0.0000*	*0.0000*				
Risk	0.0167	0.0164	-0.1566	0.0230	0.1712	0.2044	1.0000		
	0.5933	*0.5819*	*0.0000*	*0.4236*	*0.0000*	*0.0000*			
Lerner	-0.0295	0.0478	0.2076	-0.1688	0.2450	0.1752	-0.0017	1.0000	
	0.3924	*0.1445*	*0.0000*	*0.0000*	*0.0000*	*0.0003*	*0.9587*		
REG	-0.0268	-0.0274	0.1099	-0.0101	-0.1712	-0.0835	-0.2605	0.0676	1.0000
	0.3869	*0.2581*	*0.0001*	*0.7219*	*0.0000*	*0.0749*	*0.0000*	*0.0327*	

The sample for this study spans from 2004-2013. P-values in italics.

Appendix C

Table C1: Estimates of Model.1 using bank data (robustness check)

	Size	Liq	Cap	Risk	Size Liq	Size Cap	Size Risk	Liq Cap	Liq Risk	Cap Risk	Size Liq Cap Risk	Foreign
Specification	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
ΔR_t	0.0305***	0.0234***	0.0256**	0.0211**	0.0276***	0.0290***	0.0198**	0.0252**	0.0223**	0.0215**	0.0224***	0.0236**
ΔR_{t-1}	0.0283***	0.0149**	0.0188**	0.0222**	0.0273***	0.0284***	0.0320***	0.0152**	0.0179**	0.0187**	0.0297***	0.0314**
$GGDP_t$	0.0641***	0.0517**	0.0550**	0.0546**	0.0595***	0.0626***	0.0631***	0.0500**	0.0482**	0.0545**	0.0559***	0.0393**
$GGDP_{t-1}$	0.0600***	0.0125	0.033***	0.0340***	0.0383**	0.0591***	0.0611***	0.0115	0.0109	0.0331***	0.0381**	0.0487***
CPI_t	-0.0049	0.0120*	0.0116*	0.0120*	-0.0043	-0.0043	-0.0046	0.0115*	0.0119*	0.0115*	-0.0033	-0.00159
CPI_{t-1}	-0.025***	-0.0116	-0.017***	-0.018***	-0.020***	-0.026***	-0.029***	-0.0123*	-0.0133*	-0.018***	-0.0238***	-0.0259**
$Size_{it-1}$	-0.201***				-0.195***	-0.197***	-0.207***				-0.196***	-0.234***
$Size_{it-1} \times \Delta R_t$	0.0001				-0.0003	-0.0037	-0.0029				-0.0057	-0.0147
Liq_{it-1}		1.061**			0.991**			1.060**	1.124***		1.047**	0.863*
$Liq_{it-1} \times \Delta R_t$		-0.0251						-0.0093	-0.0540		-0.0267	-0.0976
Cap_{it-1}			0.9160			0.4280		0.8040		0.8700	-0.2230	0.391
$Cap_{it-1} \times \Delta R_t$			-0.1640			-0.2190		-0.1060		-0.1120	-0.2290	-0.227
$Risk_{it-1}$				0.0068			0.0049		0.00883*	0.0022	0.00705*	0.0059
$Risk_{it-1} \times \Delta R_t$				-0.0003			-0.0009**		-0.0002	-0.0002	-0.0004*	-0.0006*
$Size_{it-1} \times \Delta R_{t-1}$	-0.0010				-0.0004	0.0009	-0.0028				0.0029	0.0122*
$Liq_{it-1} \times \Delta R_{t-1}$		0.0282						0.0265	0.0092		0.0211	0.100*
$Cap_{it-1} \times \Delta R_{t-1}$			0.0584			0.0237		0.0137		0.0926	0.0104	0.458
$Risk_{it-1} \times \Delta R_{t-1}$				0.0002			0.0001		0.0001	0.0000	0.0001	-0.0001
$Size_{it-1} \times Liq_{it-1} \times \Delta R_t$					-0.0154							
$Size_{it-1} \times Liq_{it-1} \times \Delta R_{t-1}$					0.00176							
$Size_{it-1} \times Cap_{it-1} \times \Delta R_t$						-0.00764						
$Size_{it-1} \times Cap_{it-1} \times \Delta R_{t-1}$						-0.0201						
$Size_{it-1} \times Risk_{it-1} \times \Delta R_t$							-0.0002*					
$Size_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$							-0.0002					
$Liq_{it-1} \times Cap_{it-1} \times \Delta R_t$								-0.650				
$Liq_{it-1} \times Cap_{it-1} \times \Delta R_{t-1}$								-0.132				
$Liq_{it-1} \times Risk_{it-1} \times \Delta R_t$									-0.00281			
$Liq_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$									-0.00130			
$Cap_{it-1} \times Risk_{it-1} \times \Delta R_t$										0.00826		
$Cap_{it-1} \times Risk_{it-1} \times \Delta R_{t-1}$										0.00574		
Country control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-0.188	-0.179	0.358	0.195	-0.589	-0.0791	-0.153	-0.0658	-0.323	0.376	-0.563	-0.481
R-squared	0.142	0.110	0.067	0.055	0.194	0.150	0.151	0.127	0.122	0.065	0.210	0.230
Number of observations	964	964	964	945	964	964	945	964	945	945	945	595

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔRt = yearly change of the short-term interest rate; Size it-1 = log of total assets; Liqit-1= liquidity ratio; Cap it-1= capital to asset ratio and Risk it-1= return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA). Standard errors are robust yet are not depicted. Country control denotes regulation with respect to enforcing contract law and resolving insolvency. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table C2: Main estimations, including Lerner index

	Main results		
Specification	**1**	**2**	**3**
ΔR_t	0.0289***	0.0318***	0.0166*
ΔR_{t-1}	0.0178**	0.0244***	0.0234**
$GGDP_t$	0.0624**	0.0617**	0.0621***
$GGDP_{t-1}$	0.0400**	0.0508**	0.0542**
CPI_t	0.0118**	-0.0009	-0.0005
CPI_{t-1}	-0.0187***	-0.0235**	-0.0283***
Size $_{it-1}$		-0.172*	-0.184*
Size $_{it-1}\times\Delta R_t$			-0.0073
Liq_{it-1}		0.621**	0.611**
Liq $_{it-1}\times\Delta R_t$			-0.0241
Cap $_{it-1}$		0.0623	-0.2560
Cap $_{it-1}\times\Delta R_t$			-0.1480
Risk $_{it-1}$		0.0075	0.0073
Risk $_{it-1}\times\Delta R_t$			-0.0010*
Lerner Index $_{it-1}$	-0.0104	-0.0109	-0.0026
Lerner Index $_{it-1}*\Delta R_t$	-0.1150	-0.1010	-0.0997
Size $_{it-1}\times\Delta R_{t-1}$			0.0031
Liq $_{it-1}\times\Delta R_{t-1}$			0.0323
Cap $_{it-1}\times\Delta R_{t-1}$			-0.0447
Risk $_{it-1}\times\Delta R_{t-1}$			-0.0002
Lerner Index $_{it-1}\times\Delta R_{t-1}$	0.0016	-0.0038	-0.0101
Country control	Yes	Yes	Yes
Intercept	-0.190	-0.838	-0.680
R-squared	0.088	0.199	0.206
Number of observations	663	663	663

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔRt = yearly change of the short-term interest rate; Size it-1 = log of total assets; Liqit-1= liquidity ratio; Cap it-1= capital to asset ratio, Risk it-1= return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on assets (SDROA) and Lerner index it-1= is determined as the proportion of the remainder between price of output and marginal cost to the price. Country control denotes regulation with respect to enforcing contract law and resolving insolvency. Standard errors are robust yet are not depicted. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table C3: Regression results: Crisis effects

	Crisis results					
Specification	**1**	**2**	**3**	**4**	**5**	**6**
ΔR_{t-1}	0.0283	0.0056	-0.0051	-0.0067	-0.0079	0.0507*
ΔR_{t-1}*C	-0.0321*	-0.0055	0.0059	0.0137	0.0059	-0.0610*
Central bank assets/GDP $_{t-1}$	-1.138***	-0.519***	-0.591***	-0.553***	-0.640***	-1.066***
$GGDP_{t-1}$	-0.0426**	-0.0362*	-0.0291*	-0.0207	-0.0296	-0.0327**
CPI_{t-1}	-0.0094*	0.0039	0.0006	-0.0002	0.0005	-0.0038
Size $_{it-1}$	-0.298***					-0.263***
Size $_{it-1}$*C	0.0126					0.0042
Size $_{it-1}\times\Delta R_{t-1}$	-0.0025					0.0000
Size $_{it-1}\times\Delta R_{t-1}$*C	0.0000					-0.0016
Liq_{it-1}		1.007**				0.496*
Liq_{it-1}*C		-0.0645				-0.4290
Liq $_{it-1}\times\Delta R_{t-1}$		-0.0144				-0.0304
Liq $_{it-1}\times\Delta R_{t-1}$*C		-0.0059				0.0088
Cap $_{it-1}$			0.6400			-0.7630
Cap $_{it-1}$*C			0.7340			-0.1570
Cap $_{it-1}\times\Delta R_{t-1}$			0.0248			0.4400
Cap $_{it-1}\times\Delta R_{t-1}$*C			0.1420			-0.5110
Risk $_{it-1}$				0.0054		0.0042
Risk $_{it-1}$*C				0.0017		0.0009
Risk $_{it-1}\times\Delta R_{t-1}$				-0.0005		0.0009
Risk $_{it-1}\times\Delta R_{t-1}$*C				0.0010		-0.0012
Lerner Index it-1					-0.0169	-0.0282
Lerner Index it-1*C					0.0341	0.0504
Lerner Index it-1*ΔRt-1					-0.0244	-0.1080
Lerner Index it-1*ΔRt-1*C					0.0386	0.1150
Country control	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-0.959*	-0.2360	0.0394	-0.1600	-0.1510	0.306***
R-squared	0.236	0.092	0.055	0.048	0.054	0.302
Number of observations	964	964	964	945	777	763

Panel estimation with bank fixed effects. Dependant variable is the loan growth rate, ΔRt = yearly change of the short-term interest rate; Size it-1 = log of total assets; Lic 1= liquidity ratio; Cap it-1= capital to asset ratio, Risk it-1= return on assets (ROA) + equity capital to assets ratio (CAR) divided by standard deviation of return on ass (SDROA) and Lerner index it-1= is determined as the proportion of the remainder between price of output and marginal cost to the price. Country control denotes regulat with respect to enforcing contract law and resolving insolvency. Standard errors are robust yet are not depicted. C= dummy crisis. The symbols ***, **, and * indica significance levels of a statistic at the 1%, 5%, and 10% respectively.

Chapter 3: The impact of a low interest rate environment: Empirical evidence from the euro area Bank Lending Survey

3.1 Introduction

The euro was introduced to international financial markets in 1999 and was a crucial course of action in European integration, merging the biggest trade bloc at the time and establishing a powerful world currency. The euro is the single currency in 19 of the European Union's Member States which combine to form the Eurozone. The European Central Bank (ECB) functions in part to steer the monetary policy in the Eurozone, a world economy trumped only by the United States (U.S.).

The 2008–2009 Global Financial Crisis (GFC) has had a detrimental impact on bank lending in the main industrialised nations, together with the euro area with significant levels of heterogeneity within the different nations (Ciccarelli *et al*., 2013; De Santis and Surico, 2013). Additionally, inside this region, capital to the corporate segment is primarily supplied by banks, which is equal to approximately 80% as proposed by Allen *et al.* (2004). As a result, this has had negative repercussions for banks' health, with respect to cost of funds and balance sheet; therefore, their capacity to approve loans or credit lines has been diminished.

Empirical studies implicate the origin of the financial crisis as stemming from an immoderate relaxation of lending standards as a result of excessively low levels of short-term policies accepted in the central banks (Taylor, 2009; Allen and Carletti, 2010; Maddaloni and Peydro, 2011; Forbes, 2015; among others).

Moreover, in light of the GFC of recent times and the ensuing protracted periods of record low real interest rates prevalent in the more established economic nations, the debate

regarding the tendency of economic entities to assume additional risk during periods of low interest rates has been resurrected (Diamond and Rajan, 2006; Adrian and Shin, 2010; Borio and Zhu, 2012; Jimenez *et al.*, 2014; Ioannidou *et al.*, 2015; among others). Accordingly, this question has fuelled speculation regarding the effects of the risk-taking channel, a further mechanism in monetary policy transmission, on the credit supply.

Furthermore, with the purpose of assisting liquidity levels within the euro area banks, the ECB carried out two Long-Term Refinancing Operations (LTROs) in December 2011 and February 2012 where a total sum of €1 trillion cheap loans was injected into the euro area banking system. The current available literature regarding these subjects is inconclusive, meriting further investigation.

The aim of this chapter is to build on the empirical works by Maddaloni and Peydro (2011/2013) through empirically developing the evaluation of the euro area Bank Lending Survey (BLS) and highlighting the 9 euro area countries that participated since the initiation of the survey. Having identified a gap in the existing literature, this chapter attempts to add to the current research by further considering the post-financial crisis time frame. Additional new queries corresponding to consumer credit in parallel with those related to enterprises and households are therefore addressed. In this case the Eurozone embodies a novel institutional environment with a collective monetary policy.

The contributions of this chapter to the existing literature are fourfold: (1) the period following the financial crisis experienced an additional decline in short term interest rates, so much so that the value remained negative throughout this period.[23] Accordingly, the influence of monetary policy rates on lending standards for this time frame is analysed with the purpose of deciding if maintaining policy rates at a previously unsurpassed low value has actually resulted in additional relaxation of bank's credit standards; (2) the time

[23] Figure 4 documents the trend of short term interest rates in the EU-9 countries.

frames pre-, mid- and post-crisis are independently evaluated, given that the ECB does not have a policy of publicly reporting the survey data for Austria, Ireland and Finland in net percentage terms. The prior results obtained by Maddaloni and Peydro (2011/2013) cannot be the sole basis of reference, given that their conclusions are sourced from the U.S. opinion survey and 12 Eurozone nations that contributed from the beginning of the survey. Consequently, the nations chosen for empirical analysis are as follows: Belgium, France, Germany, Greece, Italy, Luxembourg, the Netherlands, Portugal and Spain, hereafter EU-9; (3) the selected countries are grouped according to the effects as well as the severity of the financial crisis into two panels of A and B. Panel A consists of Greece, Spain, Italy and Portugal, while Panel B contains Belgium, France, Germany, Luxembourg, the Netherlands. The purpose of this task is to evaluate the impact of monetary policy rates on banks' margins concerning riskier loans particularly for the pre- and post-financial crisis periods; (4) the efficiency of the ECB 3 year LTROs that were carried out in December 2011 and February 2012 are evaluated in great depth in order to determine whether banks' credit standards have been relaxed and ascertain the degree to which demand for loans has risen considering that a total sum of €1 trillion cheap loans was injected into the European Union (EU) banking system under these operations.

Over the period of the evaluation, the following outcomes are recorded: the results indicate that low-short term interest rates prior to the crisis caused a loosening of credit standards concerning enterprises, household and consumer loans. In spite of the scope of expansionary monetary policy primarily documented in the post-crisis period, we find that negative Taylor-rule residuals only led to softening of total lending standards for enterprises loans while the demand for loans remained somewhat consistent.

The data shows that higher rates of GDP growth are linked with the softening of total lending standards, particularly in the pre-crisis sample, corroborating the argument made

in Maddaloni and Peydro (2011) which states that banks' credit standards are '*pro-cyclical*'. Moreover, 10-year government bond rates are largely not quantified as statistically significant, stressing the fact that lending standards are not impacted by long-term national interest rates.

It can be determined that prior to the beginning of the crisis, banks unexpectedly relaxed margins for loans to borrowers perceived as riskier, in an environment of low monetary rates; this conclusion supports the prior conclusion made by Jimenez *et al.* (2014) and Ioannidou *et al.* (2015). Yet, in stressed nations the data suggests that excessive risk-taking in bank lending behaviour happened, mainly during periods of low monetary policy rates both pre- and post-crisis.

The implementation of the 3 years LTRO by the ECB negatively impacted the development of banks' credit tightening, which is encouraging and vital in order to mitigate the probable, severe consequences of the latest financial crisis. Regardless, the advantages of this scheme have yet to be experienced within the EU-9 real economy with a simultaneous increase in net demand. This deduction is in keeping with Popov and Van Horen (2015), a study which indicates that the reduced rate of lending persisted after the ECB's LTRO in December 2011 and these measures were apparently unsuccessful in preventing the total reduction in bank lending in the euro area.

The rest of this chapter is structured in the following layout. Section 3.2 presents a review of the empirical literature. Section 3.3 details an in-depth outline of the data and methodological framework. Section 3.4 discusses the empirical results, while section 3.5 provides the conclusions.

3.2 Literature review

In order to fully grasp the concepts discussed in this study, it would be prudent to briefly review the fundamentals of the terms intrinsic to the subject. First, this section offers a crucial analysis of the empirical studies which utilised the lending survey data of the euro area in conjunction with data from the US. Subsequently, we examine the topical discussion during the time frame of low interest rates and their effects on banks' lending behaviour. In addition, the recent measures adopted by the ECB in the wake of the financial crisis are examined here, noting the cautious lending behaviour by banks to the public and the private sector. Lastly, research questions with their corresponding supporting rationales are presented.

3.2.1 What do lending surveys actually reveal about the impact of monetary policy?

Ever since January 2003 after the BLS specific to the euro area was initiated, researchers have been increasingly curious to analyse its data. Yet, given the survey's brief nature, such an investigation was delayed and is only now being explored.

De Bondt *et al*. (2010) demonstrate that data in the BLS allows the estimation of realised and expected credit standards in the euro area. The study suggests that, in addition to loan demand and the official interest rate, bank loan supply factors, the balance sheet position of borrowers and risk perception in the economy should also be included when determining important factors for bank credit and real GDP growth. Similarly, Hempell and Kok (2010) utilise an identical approach and information with the purpose of conducting an investigation that concentrates on the crisis phase while, analysing the comparative significance attributed to different elements responsible for supply limitations.

An examination of the available literature reveals that just a handful of studies have benefited from the bank-level BLS information. The Blaes (2011) study investigates the potential function of limitations applying to banks by characterising the distinct decrease in bank lending to German non-financial corporations (NFCs) throughout the course of the credit crisis. The study reports that the stifling influence of limitations applied to banks was harshest from quarter three of 2009 to quarter one of 2010. Correspondingly, a study by Del Giovane *et al.* (2011) merges micro data regarding the cost of lending together with data concerning loan regulations taken from banks in Italy partaking in the survey. The study concludes that supply elements, for example balance sheet positions and perceived credit risk, are important; these elements ostensibly exerted subtle influences on the decline of bank loans throughout Italy during the crisis period from 2007 to 2009. Concentrating on the euro area nations, Maddaloni and Peydro (2013) evaluate the influence of short-term interest rates and macroprudential policy on lending standards prior to the financial crisis, and regarding the provision of central bank liquidity throughout the crisis utilising the BLS data from 2002Q4-2010Q4, the outcome implies that monetary policy rates and central bank provision of long-term liquidity function in a supplementary capacity to obviate a potential credit crisis for firms

When examining the US, Berger and Udell (2004) utilise individual bank-level data of US banks' lending standards during the period 1980–2000. The research offers supporting data by demonstrating that the reduced capacity of the loan officer may be employed as a reason for the detected pro-cyclicality specific to bank loans. Furthermore, Lown and Morgan (2006) employ a VAR examination through utilising macro-data gathered by the Federal Reserve's Loan Officer Opinion Survey (SOSLP) and demonstrate that variation in the credit supply standards assist in forecasting progress in lending and economic

activity.[24] The study demonstrates that each recession period has preceded a period of modest constriction of credit standards.

A seminal paper by Maddaloni and Peydro (2011) utilising a novel collection of data from the euro area and the U.S. bank lending standards suggests that low (monetary policy) short-term interest rates relax standards for both household and corporate loans. This relaxation—particularly for mortgages—is augmented through securitisation action, supervision for bank capital and low monetary policy rates for a protracted time frame. On the other hand low long-term interest rates fail to relax lending standards. Ultimately, nations with more relaxed lending standards prior to the crisis corresponding to negative Taylor rule residuals subsequently produced a poorer economic display. Such conclusions aid in elucidating the source of the crisis, while also offering significant implications to policy.

Moreover, Bassett *et al.* (2014) utilise research to take advantage of the bank level reaction to the SOSLP; the results show that modified lending standards, adapted for the macroeconomic and bank-related elements, influence loan demand. Constrictive shocks affecting the credit supply result in a significant decrease in output and the capacity of businesses and households to borrow funds from banks, in addition to broadening credit spreads and an easing of monetary policy.

3.2.2 Low interest rates monetary framework and bank lending behaviour

The debate of whether low interest rates could involve additional risk-taking through bank lending behaviour has developed into a primary point of contention in contemporary economic literature and among practitioners. Yet, the contemporary available literature regarding this subject is indecisive, warranting further investigation.

[24] In order to examine empirical investigations which utilise SOSLP, refer to Lown e*t al.* (2000b), Lown and Morgan (2002), Cunningham (2006), Basistha and Kurov (2008), Hirtle (2009), Ivashina and Scharfstein (2010), and Becker and Ivashina (2014), among others.

Indeed the justification for a risk-taking channel in the presence of low interest rates could be that these conditions motivate asset managers to assume additional risk for three types of reasons: behavioural, contractual or institutional (Rajan, 2006).[25] The aforementioned explanation is known as the '*search for yield*' and leads to an unusually high rise in demand for riskier assets with the potential for higher returns from banks.

The risk-taking channel in the transmission of monetary policy is well-defined by Borio and Zhu (2012) which characterise the channel as the effect of variations in policy rates with respect to either risk-tolerance or perception of risk; specifically, these policy changes affect the magnitude of risk present in portfolios, the valuation of assets and the extension of funding both in price and non-price components.[26] In contrast, elevated interest rates diminish banks' net worth resulting in "*gambling for resurrection*" as a solution (Kane, 1989). One method of reinforcing this influence is practicing extensive utilisation of Value-at-Risk approaches for economic and regulatory capital objectives (Danielsson *et al.*, 2004). A study conducted by Gambacorta (2009) highlights that rising markets confer increased stability, which allows financial firms to take advantage of their risk budgets, promoting position-taking. By the same token Adrian and Shin (2010) suggest a model in which banks actively modify their balance sheets to reflect economic conditions; specifically, they offer more leverage during economic booms and less during bursts. Therefore, it can be said in this case that leverage is procyclical.[27]

The results from a seminal study by Jimenez *et al.* (2014) indicate that banks are far more inclined to undertake high-risk lending practices as a result of lower overnight interest

[25] Similarly, Adrian *et al.* (2010) stress that changes to the monetary policy stance impact the essential "*risk appetite*" of financial intermediaries.

[26] Borio and Zhu (2012) argue that the procyclical influence from assessments of probability of default, loss given default, correlations and volatilities is a robust indicator of the effect of risk perceptions. See as well Allen and Gale (2000), Diamond and Rajan (2006), and Acharya and Naqvi (2012), among others.

[27] Leverage of this nature is interpreted as the result of banks' activity and management which serve to enhance their balance sheets in response to variations in measured risk and prices.

rates. In fact these conditions appear to motivate banks with relatively less funding to accept increased numbers of loan applications from firms that were previously considered too risky. If an application was approved, the loan was for an unusually high amount and not secured through use of collateral. Additionally, loan applications approved by lesser-funded banks are also more likely to default under conditions of low overnight rates. However, long-term lower interest rates along with current account deficits, securitisation and additional important macro variables do not have this impact. The study concludes that monetary policy does have an impact on credit supply composition, especially when analysing credit risk.

From 1999 to 2003 in Bolivia there were substantial fluctuations in the federal funds rate. Ioannidou *et al.* (2015) investigate the effect of this rate on the pricing and risk of new bank loans during this period. The results indicate that reduced US federal funds rates before loan origination increase the likelihood of default for bank loans granted to individuals for each month. Moreover, banks with higher liquidity and lesser funding from foreign sources assume additional risk during periods of low federal funding. Under these conditions such banks even decrease loan distribution in spite of the presumed higher element of risk associated with this strategy.[28]

3.2.3 Expansionary monetary policy vs. cautious lending by Eurozone banks

While analysing the goal of the ECB, Cour-Thimann and Winkler (2012) state that the central bank employs non-standard measures that act as a complement to the standard interest rate policy rather than as a replacement for it. These non-standard measures have been primarily targeted towards banks in order to avoid chaotic deleveraging in the euro

[28] It is worthwhile mentioning that the Bolivian economy is not harmonised with the American economy; however, its banking system is almost completely dollarized. Accordingly, the US federal funds rate is deemed to be the best suited measure of monetary policy (Ioannidou *et al*., 2015). This seminal study was indeed among the first empirical works that unveiled the influence of monetary policy on risk-taking by banks.

area economy and enhance liquidity and funding (Cour-Thimann and Winkler, 2012). Accordingly, the ECB's unconventional monetary policies are expected to safeguard the ability of solvent banks in the region to maintain lending to the public and private sectors. A study by Ciccarelli *et al*. (2013) investigates the monetary transmission via banks of different sizes and finds that, by the end of 2011, the effects of borrower's credit frictions were not attenuated, particularly in the struggling nations. Given that smaller banks generally lend to Small and Medium Sized Enterprises (SMEs), the study suggests that the procedures implemented until 2011 likely failed to rectify issues regarding credit availability which arose from adverse risk conditions and the declining net worth of firms. This conclusion is especially relevant to smaller firms in distressed the euro area nations.

Upon examining data from 91 large banks in 45 nations, Beck *et al*. (2011) determine that foreign, domestic private and government-owned banks utilise a variety of lending technologies and organisational structures for the purpose of financing SMEs. Loans to these smaller firms, specifically in the context of extent, type and pricing, are weakly correlated with the aforementioned technologies and structures, signifying that '*relationship lending'* need not be the sole basis for SME loans.[29]

In order to determine the relationship between monetary policy and lending in Europe, De Santis and Surico (2013) evaluate balance sheet data of the four largest economies in the Eurozone sampled from 1999 to 2011. The study reveals that in Germany and Italy, which both house a relatively large number of banks, the impact of monetary policy on lending was pronounced and diverse. In contrast, the impact in Spain was relatively weak and France experienced a more homogenous effect; both nations are characterised by a

[29] In support of this conclusion, Beck *et al*. (2011) also find little significant variation regarding the extent, type and pricing of SME funding among different types of banks. Alternatively, significant variation is found between developed and developing nations, considered to be a result of variation in legal and institutional financial systems.

relatively higher degree of market concentration. Furthermore, some data suggests that monetary policy has a greater influence on the relatively smaller savings banks in Italy, and the savings and cooperative banks that possess relatively low liquidity and capital in Germany. In the euro area the 2007-8 economic crisis has had a negative impact on the Monetary Transmission Mechanism (MTM) (Öztürk and Mrkaic, 2014). When conducting an analysis to determine the level of access that SMEs have to bank financing, data from several thousand firms from the euro area reveals that the costs associated with modifications to the leverage of the borrower as well as bank funding affect the aforementioned access to finance for these smaller firms. Specifically, greater borrowers' debt-to-asset ratios and bank financing costs are adversely and significantly correlated with SMEs' access to financing.

Furthermore, monetary policy inside the Eurozone experienced '*fragmenting*', specifically in terms of the fact that reduced interest rates determined by the ECB did not influence the banks in periphery nations to stop charging high lending rates by banks in said countries, relative to the *'core'* nations. Accordingly, these higher interest rates documented in the periphery nations exhibited a risk associated with the exchange rate that would normally be absent from a completely developed monetary union, which served to warp the allotment of capital and hinder lending activity and volume to SMEs especially, leading to poor economic growth in the periphery nations (Mullineux, 2015).

In June 2014 the ECB issued a package of measures utilising a strategy comparable to that of the UK's '*Funding for Lending Scheme'* (FLS) overseen by HM Treasury and the Bank of England. In August 2012 the FLS began offering cheap loans for up to a period of four years to financial institutions that demonstrated increased mortgage and SME lending. However, the FLS has not managed to successfully stimulate a significant increase in lending to SMEs in the UK (Mullineux, 2013 and 2015). Notwithstanding, the

ECB is set to enact a *'Targeted LTRO'* (TLTRO) scheme that facilitates expanded access to cheap financing for SME lending (Mullineux, 2015). In order to support this scheme and to stimulate the future SME lending market, the ECB is also considering the benefits of buying SME-loan backed securities. When evaluating studies for relevance to these issues, it is important to note that most of the available literature on unconventional monetary policy does not consider the ECB's 3 year LTROs which were carried out in December 2011 and February 2012 where a total sum of €1 trillion cheap loans was injected into the banking system in order to facilitate lending by bank to SMEs that were hit by the crisis in the Eurozone.[30]

3.2.4 Hypotheses development

We carry out an empirical assessment through evaluating the subsequently outlined research hypotheses in the EU-9:

Hypothesis 1. *The protracted periods of low monetary conditions prior to the financial crisis result in an excessive relaxation of banks' credit standards as applied to approval of loans or credit lines to enterprises, households and consumer credit.*

The first hypothesis can be tested by utilising the following reasoning: in the pre-crisis sample we expect to establish a direct relationship between the effect of low level of interest rates and softening of banks' credit standards to enterprises, households and consumer credit loans. This justification is in line with Maddaloni and Peydro (2011). Accordingly, total banks' credit standards are examined and factors influencing this variable originating from cost of funds and balance sheet constraint will be rigorously scrutinised.

[30] One exception to this is Darracq-Paries and De Santis (2015) which used the BLS data from 2003Q1-2011Q4 and just the un-published ad-hoc questionnaire of the BLS in February 2012 to estimate a panel VAR for the euro area countries.

Hypothesis II. *The intensity of the relationship between the low level of interest rates and softening of banks' credit standards has modified in response to the expansionary monetary policy both during and after the financial crisis.*

It is worthwhile to note the scale of the expansionary monetary policy in both mid- and post-crisis periods, characterised by low policy rates, in which 21 successive quarters saw the weighted average for Taylor rule residuals remain negative during the 2009:Q4-2014:Q4. The second hypothesis is established through adopting the similar methodological approach as outlined in the first hypothesis; therefore, the potential modification to banks' credit standards can be explored in depth.

Hypothesis III. *The data support excessive risk-taking behaviour by banks in stressed vs. non-stressed countries of the EU-9 prior and post financial crisis.*

We regroup the selected countries in our original sample according to the effects as well as the severity of the financial crisis into two panels of A and B. Panel A consists of Greece, Spain, Italy and Portugal, while Panel B contains Belgium, France, Germany, Luxembourg and the Netherlands. The purpose of this exercise is to evaluate the impact of monetary policy rates on banks' margins concerning riskier loans, particularly for the pre- and post-financial crisis periods. On a related note Ciccarelli *et al*. (2013) imply that banks within stressed countries in the euro area relied more on the liquidity offered via the Eurosystem. Hence, relative to Panel B countries, Panel A countries are predicted to practice more excessive risk-taking behaviour during the pre-crisis period in connection with the previously mentioned three categories of loans; this may be deemed a potential cause that exacerbated the economic impact of the 2007-8 crisis. Accordingly, this present study conducts additional testing to reveal any progress in this respect regarding the selection obtained during the post-crisis period.

Hypothesis IV. *The ECB's 3 year LTROs liquidity injection into the EU banking system translate into a softening of bank lending standards and the demand for loans has risen corresponding to enterprises, households and consumer credit.*

Fourth, with the purpose of determining the effectiveness of unconventional monetary policies, Gambacorta and Marques-Ibanez (2011) and Fungáčová *et al.* (2014) deliberate the proxy in their respective investigations, which is specified as a ratio of each central total asset to nominal GDP (Assets/GDP ratio). Considering the non-usage of bank level data in this study, such a method is not feasible here. Consequently, the BLS quarterly data is relied upon, particularly the modification within credit standards and demand during the course of implementing these measures.

The aim of this exercise is to determine whether such processes translated into a softening of lending standards/conditions and to ascertain the degree to which the demand for loans has risen corresponding to enterprises, households and consumer credit in the nations being analysed.

3.3 Methodology

3.3.1 The data[31]

The primary dataset employed in this present research is sourced from the BLS that is directed at senior loan officers of a representative sample of the euro area banks and considers the traits of their corresponding national banking structure and in so doing calls

[31] The BLS for the euro area was first conducted in 2003. Its main goal is to improve on the Eurosystem's understanding of financing circumstances in the Eurozone**.** The BLS sheds light on the ECB Governing Council's analysis of monetary and economic developments, with which it formulates it monetary policy. The array of banks presented in the sample is demonstrative of the banking segment in each country. This suggests that the selected sample highlighted in this study was typically comprised of banks of a varied size; however, at an earlier stage of the BLS survey some preferential treatment was issued to address large banks (Berg *et al.*, 2005; Ciccarelli *et al.*, 2011 and Maddaloni and Peydro, 2011). The BLS gives balance to current data on loans and bank lending rates with rigorous statistical analysis on supply and demand conditions in the Eurozone credit markets**.** It includes data pertaining to lending decision of euro area banks**.** Topics the questionnaire touch upon are the credit standards banks apply whilst approving loans, the terms and conditions of new loans to enterprises and households and an analysis when addressing the for bank loans.

upon them to supply quarterly data regarding the lending standards that banks offer borrowers and on the loan demand that banks require.

The primary directive of the BLS is to increase comprehension with respect to bank lending behaviour in the euro area. The queries differentiate between three types of loan: loans or credit lines to enterprises, loans to households for house purchase, and consumer credit and other lending to households.

The investigation is conducted as a questionnaire comprising qualitative questions regarding modifications to loan conditions and demand logged over the course of the preceding three months, and future developmental projections of the same data in the period of the subsequent quarter.

The survey questions outlined in the BLS contain five optional answers. The options span from "*tightened considerably*" to "*eased considerably"* for the enquires corresponding to modifications in credit standards and from "*increased considerably*" to *"decreased considerably"* for the enquiries corresponding to loan demands. The replies are communicated with respect to net percentage, a value calculated as the difference between the percentage of banks announcing that credit standards were tightened and the percentage of banks indicating that the standards have been eased.

A positive value for the net percentage shows that a greater share of banks have tightened credit standards ("*net tightening*"), while a negative net percentage means that more banks have eased credit standards ("*net easing*"). Similarly, the expression "*net demand*" represents the difference between the percentage of banks showing a rise in loan demand and the percentage of banks experiencing a fall in said demand. Accordingly, net demand will thus have a positive value if a higher percentage of banks experience greater loan demand, while a negative value for net demand signifies that a higher percentage of banks have experienced decreased loan demand.

Results from the bank data analysed in the BLS sample are subject to a two-step aggregation. In the first step, results from solitary banks are aggregated to that of the euro area nations' national results. Here bank responses are divided into two main categories: those that are aggregated to national results via application of implicit weighting to the sample or aggregation via explicit weighting derived from the unresolved quantities of loans issued to NFCs and households of lone banks in the corresponding samples taken from each nation.[32]

The second step consists of aggregating the national BLS results to the euro area (BLS) results. Accordingly, survey responses from each nation are aggregated to the euro area BLS via the application of an explicit weighting scheme founded on the national shares in the values of unresolved loans to the aforementioned borrowers.

Following the weighting schemes, the nations' results are combined to form the euro area aggregate by utilising each nation's loans from the combined total unresolved loans in the area to residents. Conversely, weighting is not applied at the domestic level, suggesting that the individual banks are equally considered.[33]

In 2015 the selection is made up of 142 participating banks spanning the 19 euro area nations; yet, for the purpose of this present empirical study, 9 out 12 nations partaking from the beginning of the survey are also tested here.[34]

The selected banks are carefully chosen in such a way as to offer an accurate depiction of the euro area banking segment, while considering dissimilarities in the banking system between nations. Hence, the problem of sample selection bias may be avoided since the

[32] In the case that foreign banks are included in the sample, the bank lending standards concern the credit policy executed within the national market.

[33] A comprehensive description of the BLS setup was outlined in Berg *et al.* (2005). Furthermore, Hempell and Sørensen (2010) document an updated account of the BLS results until July 2009.

[34] These include a number of nations (Belgium, France, Germany, Greece, Italy, Luxembourg, the Netherlands, Portugal and Spain) that introduced the Euro on January 1, 1999. We exclude Austria, Finland and Ireland due to lack of available data.

time frame being analysed corresponded with growth in the selection size as a result of the expansion of the euro area. Statistics concerning the euro area BLS are accessible since the last quarter of 2002.

The model used in this study is built in a manner to factor in any distinct modification on banks' lending standards for the period before (2002:Q4-2008:Q3), during (2008:Q4-2010Q4) and after (2011:Q1-2014Q4) the financial crisis, which should be a sufficient duration of time considering the fact that an entire cycle of monetary policy is encompassed during these periods. In this case it is necessary to sample the aforementioned periods for the following reasons.

The present analysis will first be cut off in 2008:Q3; this point in time serves as a suitable closing window for the pre-crisis time frame, and considers the bankruptcy of Lehman Brothers which occurred on September 15, 2008, in addition to the initiation of the execution of *non-standard monetary measures* by the ECB. Next this study submits an expanded analysis of the GFC duration until the final quarter in 2010, in which the Eurosystem instigated non-standard measures of liquidity provision to the euro area banking segment. Lastly, the post-crisis sample corresponds to the allotment of the two-three year LTROs in 2011 and 2012; as a result it terminates in the final quarter of 2014. Additionally, the methodology implemented in this case to delineate the period sampled corroborates the methodologies accepted in Maddaloni and Peydro (2011/2013) which analyse survey data tailored to the U.S and the euro area. [35]

3.3.2 Macroeconomic and financial indicators

The macro and financial indicators involved in our primary investigation are short-term interest rates rates, long term interest rates (10 year government bond), Taylor rule residuals, GDP growth rate and inflation rates. Here it is noteworthy to clarify that for

[35] The Chow test is also used in order to check for the existence of a structural break.

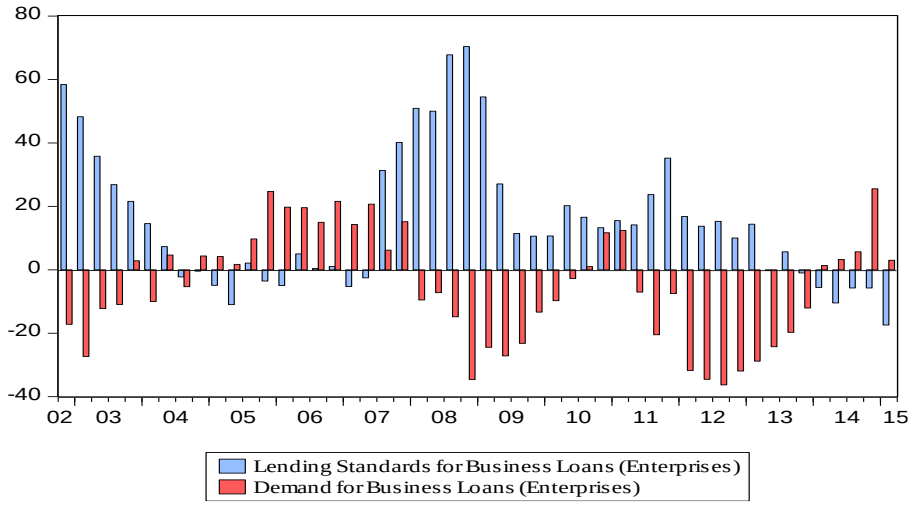
monetary policy, quarterly average of overnight rates (EONIA) are utilised. The effects of long term interest rates are assessed, since mortgage loans and consumer credits have extended maturity; consequently the credit standards are influenced to a smaller degree by short-term interest rates.

Also, monetary conditions are computed by the Taylor rule residuals (see Taylor, 2009) achieved through regressing the EONIA on both GDP growth rate and inflation rates. The residuals corresponding to each nation chosen for our selection are estimated with panel least squares regressions, thereby applying shared coefficients for all 9 countries, considering the shared monetary policy. A negative (positive) Taylor rule residual from a given moment in time represents an expansionary (contractionary) monetary policy.[36]

Figure 1-3 illustrates that the credit standards for business, mortgage and consumer loans exhibited an analogous configuration, particularly mid- (2008:Q4-2010:Q4) and post- (2011:Q1-2014:Q4) financial crisis samples; at this point it is worthwhile to note that business loans underwent the greatest tightening of credit standards relative to both mortgage and consumer loans. The demand for loans underwent moderate growth in the pre-crisis sample (2002:Q4-2008:Q3), throughout the three classes of loans, whereas there was a significant decrease during the crisis time frame with this decline particularly prominent for mortgage loans.

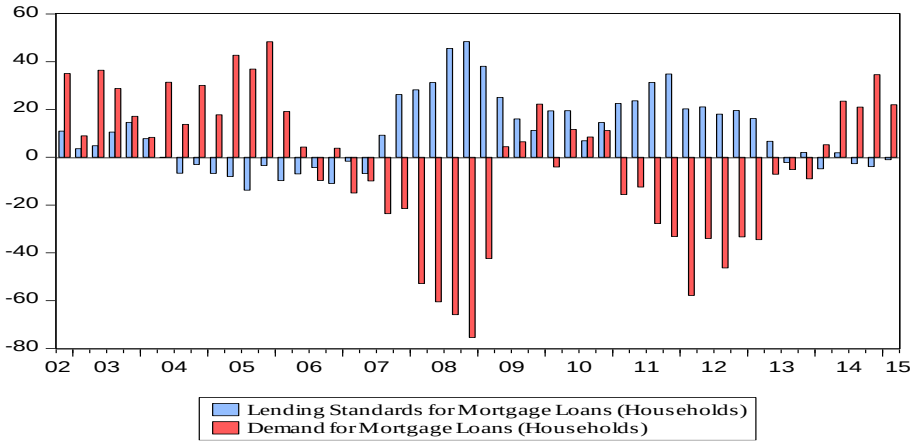
[36] Appendices A1-A3 report the descriptive statistics.

Figure 1: Credit Standards and Demand for Business Loans in EU-9 Countries



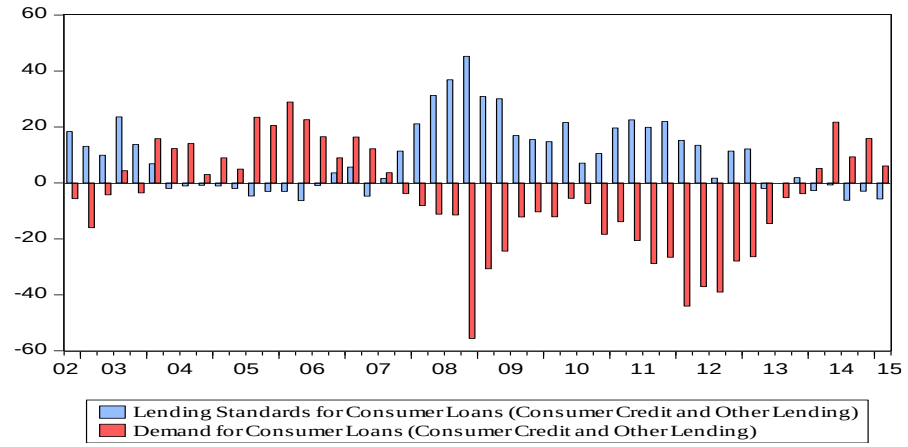
Source: (European Central Bank data warehouse, Bank Lending Survey)

Figure 2: Credit Standards and Demand for Mortgage Loans in EU-9 Countries



Source: (European Central Bank data warehouse, Bank Lending Survey)

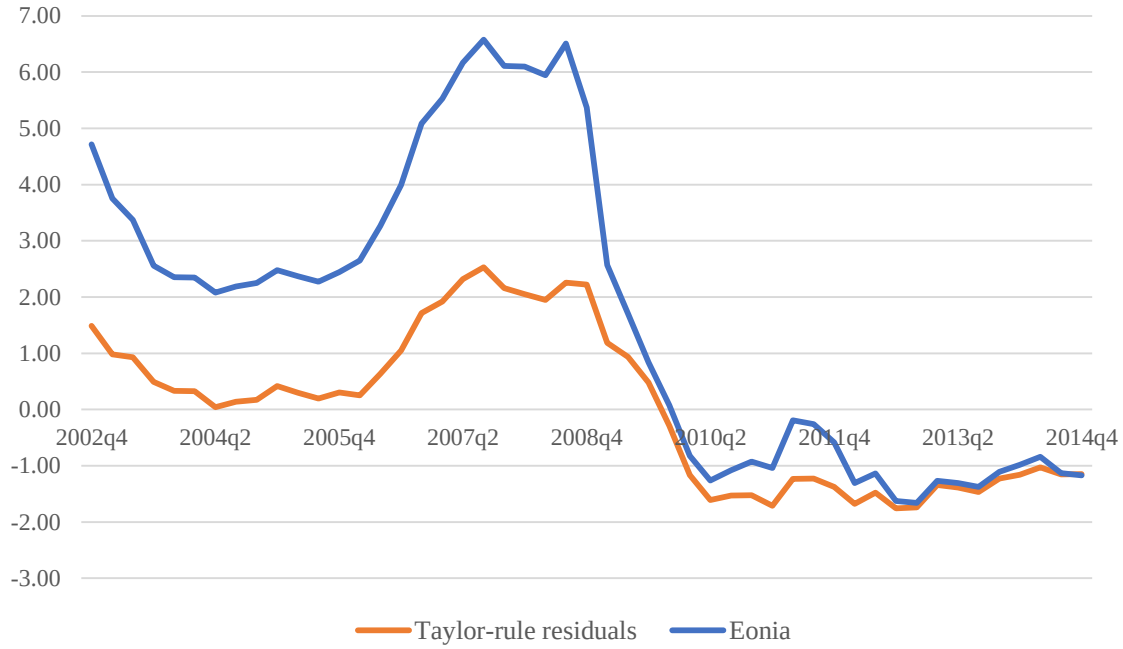
Figure 3: Credit Standards and Demand for Consumer Loans in EU-9 Countries



Source: (European Central Bank data warehouse, Bank Lending Survey)

As shown in Figure 4, substantial discrepancy exists regarding the number of times with protraction of low Taylor-rule residuals. Most notably the Taylor rule residuals remained negative for 21 consecutive quarters from 2009:Q4 to 2014:Q4, suggesting the scale of expansionary monetary policy undertaken in this region; this is similar to that seen in EONIA, especially over the course of this time span.

Figure 4: Taylor-rule residuals and EONIA rates in the EU-9 countries



Notes: Figure 4 compares the Taylor-rule residuals and the EONIA rates in the EU-9 countries. Taylor-rule residuals presented are the residuals of the regressions of EONIA rates on the growth rate of GDP and inflation rate over the period spanning from 2002:Q4-2014:Q4. Here the residuals are determined individually for every member of the EU-9, and subsequently a weighted mean is determined utilising each nation's GDP. The residuals are estimated for 9 euro area countries comprising Belgium, France, Germany, Greece, Italy, Luxembourg, the Netherlands, Portugal and Spain.

3.3.3 Model specification

Considering that the issues addressed in the study are contingent on banks' credit standards and monetary policy stance in the euro area, the disturbance of the model is expected to be in violation of traditional assumptions, specifically to be vulnerable to heteroscedasticity as well as being correlated throughout the nations selected for this research.

The methodology used to tackle this here is analogous to that employed in Maddaloni and Peydro (2011). In the first part of this present study, the results are collected using Generalized Least Squares (GLS) panel regressions methodology, largely considered to be a more efficient approach as indicated in Wooldridge (2007). GLS permits the inclusion of the estimates of the variance and the covariance of the residuals in the EU-9 sample. Additionally, it permits the imposition of a parametric structure with the purpose of amending the residuals for autocorrelation. Furthermore, country fixed effects are accounted for in order to guard against any unseen variation occurring within banking structure of sampled countries in this present research.

Given that the coefficient of the lagged dependent variable is found to be significant when analysing the outcomes outlined in Table 1-3, GLS estimation methodology could be biased while considering fixed effects. Accordingly, the Generalized Method of Moments (GMM) estimator is employed for the majority of outstanding regressions, which is supported by Arellano and Bond (1991), and additionally expanded upon in Blundell and Bond (1998) which utilise lags of the dependent variable as instruments. Using this method alleviates the endogeneity issues if the instruments are not correlated with the variables in question. Consequently, the Arellano and Bond system estimator with Windmeijer (2005) corrected coefficient standard errors is employed here.

It is important to mention that the BLS data is completely stable for the euro area given that the monetary policy stance is common throughout the countries presented in our study. Accordingly, while evaluating the EU-9 nations utilising the BLS results, the first section focuses on the period pre- (2002:Q4 -2008:Q3), mid- (2008:Q4-2010:Q4) and post- (2011:Q1-2014:Q4) financial crisis.

Our empirical methodology relies on a sequence of panel regressions which have baselines of the functional form as follows **(1):**

$$Lending\ conditions_{t,i} = \alpha_i + \beta SRates_{t-1,i} + \gamma LRates_{t-1,i} + \lambda\ Taylor\text{-}rule\ residuals_{t-1,i} + \theta GDPgrowth_{t-1,i} + \delta Infalion\ rate_{t-1,i} + \rho Demand_{t-1,i} + Lending\ conditions_{t-1,i} + \varepsilon_{i,t}$$

Where *Lending conditions* $_{t,i}$ are indicative of the methods of lending conditions driven directly from the BLS at time *t* for country *i* (expressed in net percentage terms). $SRate_{t-1,i}$ and $LRates_{t-1}$ denote short and long term interest rates, respectively. *Taylor-rule residuals* are the Taylor-rule residuals of the regression of EONIA rates on GDP growth and inflation, both of which are included as macroeconomics variables. Finally $Demand_{t-1,i,}$ represents the demand for loans. In order to consider the endogeneity bias, each explanatory variable is lagged by one quarter denoted by $_{t-1}$. Within this present research involving the financial crisis and post-crisis times, additional variables are represented originating directing from the BLS.

3.4 Estimation results

Tables 1-3 thoroughly examine the effects of monetary conditions on overall lending standards as applied to approval of loans or credit lines specific for business, mortgage and consumer in EU-9 countries during the periods including pre- (2002:Q4-2008:Q3), mid- (2008:Q4-2010:Q4) and post- (2011:Q1-2014:Q4) financial crisis. Here it is prudent to refer to Question 1 and 8 described within the BLS (see Appendix B for a detailed illustration of the survey).

3.4.1 Short-term interest rates

The monetary conditions employed in this research include Euro OverNight Index Average (EONIA) and Taylor-rule residuals. Additionally, country fixed effects are considered in order to guard against unseen variation within the banking structure of the designated selection of countries in this present research. When analysing columns 1-5 illustrated in Tables 1-3, the dependant variable is described through using total lending standards calculated using the net percentage of banks detailing tighter credit standards for loans to enterprises during the preceding quarter. Next, country fixed effects are added and macroeconomic variables are included. Columns 1-3 report the outcome when regressing the total lending standards on EONIA. In columns 4-5, EONIA is substituted with Taylor-rule residuals and include macroeconomic variables every designated column. Columns 6-10 show a repetition of the same groups of regressions for total lending standards; however, they correspond to households for house purchase. Lastly, columns 11-15 are specific for total lending standards to consumer credit and other lending.

3.4.2 The impact of monetary conditions on lending standards

The following section details an analytical evaluation by conducting a thorough review of the effects of monetary conditions on total lending standards regarding the previously mentioned three categories of loans for the periods pre-, mid- and post-financial crisis in Tables 1-3. Our coefficient corresponding to EONIA exhibits a comparable configuration throughout the various specifications in the pre-crisis sample, being statistically significant at 1% in most cases, although marginally decreasing following the incorporation of further variables; this is a result of macroeconomic factors or country fixed effects, developing to 11.00*** in the foremost challenging specification in column 2 for business loans. The value of the coefficient of EONIA demonstrates a greater effect of short-term interest rates on total lending standards for loans to enterprises relative to both mortgage and consumer loans; this indicates a creditable hypothesis amid phases of too low levels of monetary policy stance preceding the beginning of the financial crisis as well as a disproportionate softening of total lending standards by banks as applied to approval of loans or credit lines. During the crisis the coefficient for EONIA underwent an additional decline for all three types of loans, as they were hit badly during this time frame.

Considering that EONIA experienced a substantial reduction, our estimation suggests that the decrease in the level of short-term interest rates has failed to manifest as a further softening of bank's credit standards as applied to approval loans relative to the selection sample pre-crisis.

Certainly this has applied to the post-crisis sample, in which monetary policy makers reacted to the GFC by slashing interest rates to levels approaching zero then maintaining those values for a record duration of time in order to facilitate bank lending activity. With

respect to such conditions, Keynes (1936) describes monetary policy as analogous to '*pushing on a string'* and additionally posits the concept of a '*liquidity trap*'. Our estimation proposes that softening of total lending standards for consumer loans has been less enhanced from the short-term interest rates reduction. However, it is noteworthy to state that the effect of short-term interest rates on total lending standards for loans to household for house purchase was marginally enhanced in comparison to the model tailored to the crisis period selection.

While substituting EONIA with Taylor-rule residuals, our estimation upholds the previous results obtained by the EONIA particularly in the pre- and post-crisis periods. Yet there is some discrepancy, since the results indicate that negative residuals lead only to a softening of total lending standards for business loans in the post-crisis time frame. At this point it is noteworthy to mention that the coefficient for the growth rate of GDP is negative, yet it stays positive for inflation rate. The results indicate that higher rates of GDP growth are associated with the softening of total lending standards, most specifically in the pre-crisis sample, which supports the justification offered in Maddaloni and Peydro (2011) which argue that banks' credit standards are '*pro-cyclical*'. This present estimation additionally indicates that an increase in the inflation rate confers a constriction of total lending standards, which may soon come as a result of predicted rises in monetary policy rates (these coefficients generally stay statistically significant throughout various specifications and maintain a positive value, which is detailed in Tables 1-3).

Table 1: Short term monetary policy stance and the lending standards prior to the financial crisis (2002:Q4-2008:Q3)

	EU-9 Countries														
	Business Loans					Mortgage Loans					Consumer Loans				
	Total Lending Standards					Total Lending Standards					Total Lending Standards				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Overnight rates $_{t-1}$	10.69	11.00	11.12			4.28	5.17	6.20			3.55	3.86	4.56		
	(7.09)***	(7.43)***	(6.83)***			(3.18)**	(3.81)***	(4.31)***			(2.71)**	(3.08)**	(3.42)***		
Taylor rule residuals $_{t-1}$				10.77	11.12				4.48	6.20				3.39	4.56
				(6.92)***	(6.83)***				(3.22)**	(4.31)***				(2.50)*	(3.42)***
GDP growth rate $_{t-1}$			-0.46	0.89	1.10			-1.72	0.16	-0.86			-1.46	0.17	-0.83
			(0.52)	(1.33)	(1.32)			(2.16)*	(0.24)	(1.12)			(2.07)*	(0.29)	(1.20)
Inflation rate $_{t-1}$			3.25	7.80	7.81			-1.76	1.67	0.80			-1.01	2.39	0.86
			(1.95)	(5.31)***	(4.71)***			(1.21)	(1.36)	(0.56)			(0.75)	(2.00)*	(0.67)
Lagged Dependent $_{t-1}$	0.66	0.63	0.59	0.60	0.59	0.66	0.53	0.49	0.65	0.49	0.61	0.52	0.48	0.60	0.48
	(16.07)***	(15.04)***	(11.83)***	(12.74)***	(11.83)***	(13.51)***	(9.55)***	(8.35)***	(12.65)***	(8.35)***	(12.65)***	(9.90)***	(8.75)***	(11.81)***	(8.75)***
Country Fixed effect	no	yes	yes	no	yes	no	yes	yes	no	yes	no	yes	yes	no	yes
No of observations	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
No of countries	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Wald Statistics	500.15***	527.92***	506.60***	484.49***	506.60***	224.86***	250.40***	262.14***	224.52***	262.14***	188.11***	211.47***	216.02***	187.40***	216.02***

Table 1 illustrates the outcome from the GLS panel regressions in which the dependant variable is specified via total lending standards, estimated through the net percentage from banks from every one of the nations belonging to the EU-9 which describes tightening of credit standards when considering the preceding quarter. The net percentages documented within the Bank Lending Survey (BLS) for EU-9 countries reflect the approval of loans or credit lines to three elements included in the BLS, which are as follows: enterprises, households and consumer credits. Responses to Question 1 and 8 are outlined in the BLS (see Appendix B for a detailed explanation of the questions posed in the survey). The overnight rates is defined here by the quarterly average of the daily overnight rates (EONIA), the growth rates of GDP are characterised by the annual growth rates of real GDP specific for every one of the nations and inflation rates are denoted by the quarterly average of inflation rates, again, specific to each nation. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame prior to the financial crisis (2002:Q4-2008Q3). Note that each explanatory variables utilised in this case is lagged by one quarter. We have a balanced panel dataset which incorporates 9 Euro-area nations: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain. We estimate the panel regression over the pre-crisis period from 2002:Q4-2008:Q3. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets.

Table 2: Short term monetary policy stance and the lending standards during the financial crisis (2008Q4-2010:Q4)

	EU-9 Countries														
	Business Loans					Mortgage Loans					Consumer Loans				
	Total Lending Standards					Total Lending Standards					Total Lending Standards				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Overnight rates $_{t-1}$	4.54	13.13	5.97			2.48	7.77	5.33			-0.98	3.54	2.91		
	(1.39)	(5.85)***	(2.17)*			(1.13)	(7.39)***	(3.00)**			(0.43)	(2.32)*	(1.46)		
Taylor rule residuals $_{t-1}$				1.61	5.97				1.13	5.33				-2.68	2.91
				(0.49)	(2.17)*				(0.44)	(3.00)**				(1.06)	(1.46)
GDP growth rate $_{t-1}$			-0.98	-0.18	-0.15			-0.78	0.39	-0.03			-0.27	-1.09	0.14
			(1.42)	(0.18)	(0.17)			(1.66)	(0.46)	(0.06)			(0.52)	(1.43)	(0.19)
Inflation rate $_{t-1}$			8.26	7.27	10.71			3.55	3.03	5.74			1.45	2.73	2.64
			(4.07)***	(2.96)**	(5.17)***			(2.36)*	(1.77)	(4.53)***			(0.90)	(1.49)	(1.89)
Lagged Dependent $_{t-1}$	0.34	0.06	-0.01	0.29	-0.01	0.61	0.11	0.01	0.64	0.01	0.51	-0.02	-0.04	0.49	-0.04
	(3.28)**	(0.85)	(0.13)	(2.63)**	(0.14)	(6.50)***	(1.35)	(0.09)	(6.69)***	(0.09)	(4.87)***	(0.17)	(0.40)	(4.60)***	(0.40)
Country Fixed effect	no	yes	yes	no	yes	no	yes	yes	no	yes	no	yes	yes	no	yes
No of observations	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
No of countries	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Wald Statistics	25.74***	140.74***	108.96***	33.31***	108.94***	54.92***	284.67***	213.08***	60.82***	213.20***	25.19***	190.00***	176.02***	29.49***	176.08***

Table 2 illustrates the outcome from the GLS panel regressions in which the dependant variable is specified via total lending standards, estimated through the net percentage from banks from every one of the nations belonging to the EU-9 which describes tightening of credit standards when considering the preceding quarter. The net percentages documented within the Bank Lending Survey (BLS) for EU-9 countries reflect the approval of loans or credit lines to three elements included in the BLS, which are as follows: enterprises, households and consumer credits. Responses to Question 1 and 8 are outlined in the BLS (see Appendix B for a detailed explanation of the questions posed in the survey). The overnight rates is defined here by the quarterly average of the daily overnight rates (EONIA), the growth rates of GDP are characterised by the annual growth rates of real GDP specific for every one of the nations and inflation rates are denoted by the quarterly average of inflation rates, again, specific to each nation. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame during the financial crisis (2008:Q4-2010Q4). Note that each explanatory variables utilised in this case is lagged by one quarter. We have a balanced panel dataset which incorporates 9 Euro-area nations: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain. We estimate the panel regression over the crisis period from 2008:Q4-2010:Q4. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets.

Table 3: Short term monetary policy stance and the lending standards after the financial crisis (2011:Q1-2014:Q4)

	EU-9 Countries														
	Business Loans					Mortgage Loans					Consumer Loans				
	Total Lending Standards					Total Lending Standards					Total Lending Standards				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Overnight rates $_{t-1}$	6.00	6.99	1.69			7.65	8.21	1.22			3.28	4.97	-3.58		
	(2.29)*	(2.80)**	(0.41)			(2.30)*	(2.70)**	(0.25)			(1.31)	(2.23)*	(0.94)		
Taylor rule residuals $_{t-1}$				7.70	1.69				6.87	1.22				2.57	-3.58
				(2.30)*	(0.41)				(1.64)	(0.25)				(0.77)	(0.94)
GDP growth rate $_{t-1}$			0.33	0.25	0.57			0.34	-0.04	0.51			1.28	0.09	0.78
			(0.47)	(0.47)	(1.00)			(0.38)	(0.06)	(0.77)			(1.87)	(0.19)	(1.59)
Inflation rate $_{t-1}$			2.88	3.21	3.58			3.86	4.44	4.36			3.63	1.77	2.16
			(2.08)*	(2.83)**	(3.13)**			(2.44)*	(3.21)**	(3.23)**			(2.95)**	(1.63)	(2.14)*
Lagged Dependent $_{t-1}$	0.61	0.49	0.41	0.55	0.41	0.46	0.37	0.34	0.39	0.34	0.52	0.35	0.32	0.49	0.32
	(9.77)***	(6.90)***	(4.81)***	(7.19)***	(4.81)***	(6.09)***	(4.83)***	(3.89)***	(4.66)***	(3.89)***	(7.00)***	(4.36)***	(3.68)***	(6.03)***	(3.68)***
Country Fixed effect	no	yes	yes	no	yes	no	yes	yes	no	yes	no	yes	yes	no	yes
No of observations	143	143	142	142	142	143	143	142	142	142	143	143	142	142	142
No of countries	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Wald Statistics	110.16***	133.68***	145.89***	120.26***	145.89***	51.95***	69.15***	93.80***	68.23***	93.80***	56.50***	85.78***	101.78***	60.16***	101.78***

Table 3 illustrates the outcome from the GLS panel regressions in which the dependant variable is specified via total lending standards, estimated through the net percentage from banks from every one of the nations belonging to the EU-9 which describes tightening of credit standards when considering the preceding quarter. The net percentages documented within the Bank Lending Survey (BLS) for EU-9 countries reflect the approval of loans or credit lines to three elements included in the BLS, which are as follows: enterprises, households and consumer credits. Responses to Question 1 and 8 are outlined in the BLS (see Appendix B for a detailed explanation of the questions posed in the survey). The overnight rates is defined here by the quarterly average of the daily overnight rates (EONIA), the growth rates of GDP are characterised by the annual growth rates of real GDP specific for every one of the nations and inflation rates are denoted by the quarterly average of inflation rates, again, specific to each nation. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame after the financial crisis (2011:Q1-2014Q4). Note that each explanatory variables utilised in this case is lagged by one quarter. We have a balanced panel dataset which incorporates 9 Euro-area nations: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain. We estimate the panel regression over the post-crisis period from 2011:Q1-2014:Q4. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively and reported in the brackets.

Furthermore, a Chow test is conducted in order to learn if the alteration in the relationship between banks' lending standards and Taylor-rule residuals is significantly distinct during the following periods: 2002Q4-2008Q3, 2008Q84-2010Q4 and 2011Q1-2014Q4. By using similar methodology adopted from Anderson and Fraser (2000), the restricted model employed permits every parameter value to differ in each of the three aforementioned periods excluding Taylor-rule residuals; the Taylor-rule residuals term possesses an identical coefficient value in each of the three spells. The derived null hypothesis states that the coefficients of the Taylor-rule residuals from 2002Q4-2008Q3, 2008Q84-2010Q4 and 2011Q1-2014Q4 are each the same value. However, test outcomes support rejecting the null hypothesis, suggesting that the association between the Taylor-rule residuals and the bank's lending standards has substantially altered in the time frames pre-, mid- and post-crisis.[37]

[37] Total lending standards: Business Loans
Taylor-rule residuals (2002Q4-2008Q3) = Taylor-rule residuals (2008Q4-2010Q4) = Taylor-rule residuals (2011Q1-2014Q4): 3.57**

Total lending standards: Mortgage Loans
Taylor-rule residuals (2002Q4-2008Q3) = Taylor-rule residuals (2008Q4-2010Q4) = Taylor-rule residuals (2011Q1-2014Q4): 12.41***

Total lending standards: Consumer Loans
Taylor-rule residuals (2002Q4-2008Q3) = Taylor-rule residuals (2008Q4-2010Q4) = Taylor-rule residuals (2011Q1-2014Q4): 7.88***

3.4.3 Short- & long-term interest rates

Tables 4-6 document that the aforementioned results (Tables 1-3) remain the same afterwards, including further variables such as changes in demand for loans and 10-year government bond rates. Our results support the idea that a reduced monetary policy stance characterised by Taylor rule residuals lead to less harsh total lending standards. Such a dynamic is especially seen in total lending standards while revealing the elements specific to the banks' balance sheets for all three types of loans pre-crisis.

In addition, by examining loan demand detailed in approximations 1-8 (see Tables 4-6), it can be inferred that this variable has a substantial effect on total lending standards. It is statistically significant in a number of cases and has conceivable negative coefficients; this conclusion is explained using the rationale that an increase in net percentage of banks recording a rise in demand for loans while being associated with an additional loosening of total lending standards by banks. Futhermore, this is supported by traditional loan demand research that states that the elasticity of the scale factor, representing financing requirements, is calculated utilising economic components, such as GDP growth rates and inflation rate, for example.

Moreover, 10-year government bond rates are mostly not quantified as statistically significant, highlighting the fact that lending standards are not affected by long-term national interest rates. Our results support the previous finding by Maddaloni and Peydro (2013) while indicating that monetary policy stance influences the total lending standards regarding variations in bank net worth resulting from different levels of banks' liquidity and capital position prior to the financial crisis.[38]

Here it is worthwhile to note the scale of the expansionary monetary policy during and after the financial crisis, in a period of low policy rates, which saw 21 successive

[38] This also applies to bank's market financing for business loans and the total lending standards from balance sheet factors concerning both mortgage and consumer loans.

quarters in which the Taylor rule residuals stayed negative from 2009:Q4 to 2014:Q4 as depicted in Figure 4. The data indicates a significant reduction in the effect of short-term interest rates concerning their ability to lower banks' total credit standards, while the demand for loan remained relatively unchanged specifically during the crisis period. Of particular interest is that despite the labours of the ECB to keep interest rates low and inject liquidity into banking systems, banks' lending standards remain subdued, as documented in the selection of EU-9 countries. Such a conclusion is corroborated by the crucial analysis of the Japanese economy in Werner (2012) which stresses that continuous short-term interest rate reductions for a period spanning over a decade were ineffective at stimulating the economy and expanding the money supply.

Table 4: The effect of monetary policy on bank's credit standards prior to the crisis (2002:Q4-2008:Q3)

	Total Lending Standards			Total Lending Standards from Balance Sheet Factors				
				Business Loans			**Mortgage Loans**	**Consumer Loans**
	Business Loans	Mortgage Loans	Consumer Loans	Bank's Capital Position	Bank's Market Financing	Bank's Liquidity Position	All Factors	All Factors
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Taylor rule residuals $_{i,t-1}$	10.28***	6.883*	5.677*	4.288***	7.148***	4.932***	3.752*	3.968
	(4.02)	(2.28)	(2.54)	(4.15)	(4.69)	(5.31)	(2.21)	(1.67)
Demand for Loans $_{i, t-1}$	0.0261	-0.0416	-0.170*	-0.0231	-0.0497	0.0231	-0.0583***	-0.0166
	(0.39)	(-0.92)	(-2.19)	(-1.12)	(-1.04)	(0.75)	(-3.47)	(-0.36)
10 Year bond Rate $_{i, t-1}$	6.444	1.093	-0.261	1.453	-3.303	1.920	-3.691	-0.639
	(1.36)	(0.30)	(-0.09)	(0.91)	(-1.51)	(0.91)	(-1.64)	(-0.19)
Inflation rate $_{i, t-1}$	8.499**	-0.662	1.890	2.728*	2.332	3.851*	-2.197	0.388
	(2.97)	(-0.48)	(0.91)	(2.55)	(0.91)	(2.01)	(-1.33)	(0.22)
GDP growth rate $_{i, t-1}$	1.593	-0.413	-0.201	0.174	2.483*	1.326**	-0.257	-0.209
	(1.68)	(-0.36)	(-0.19)	(0.32)	(2.02)	(2.69)	(-0.71)	(-0.17)
Lagged Dependent $_{i, t-1}$	0.531***	0.475***	0.508***	0.494***	0.554***	0.276*	0.527***	0.626***
	(7.23)	(3.55)	(7.32)	(11.93)	(4.70)	(2.08)	(9.58)	(9.42)
Country fixed effect	yes	yes	yes	yes	yes	yes	yes	yes
No of observations	210	210	210	210	210	210	210	210
No of countries	9	9	9	9	9	9	9	9
AR(2) p-value	0.293	0.101	0.643	0.301	0.340	0.237	0.400	0.149
p(Sargan)	0.614	0.037	0.250	0.218	0.009	0.061	0.006	0.000

Table 4 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified via total lending standards, estimated through the net percentage from banks from every one of the nations belonging to the EU-9 which describes tightening of credit standards when considering the preceding quarter. Responses to Question 1 and 8 are outlined in the BLS presented in column 1-3. Similarly, the dependant variable described by total lending standards due to balance sheet factors noted in columns (4-8) is measured by the net percentage of banks reporting a tightening of credit standards as a result of cost of funds and balance sheet constraints comprising three components which are as follows: cost related to the bank's capital position, bank's ability to access market financing and bank's liquidity position. These are specific for business loans, and all factors related to balance sheet constraints for both mortgage and consumer loans. Additionally, these are solutions to Questions 2, 9 and 11 detailed within the BLS. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame prior to the financial crisis (2002:Q4-2008Q3). Additionally the demand for loans is represented via the net percentage of banks documenting a rise in demand regarding business, mortgage and consumer loans (Question 4 and 13 in the BLS). Long term national government bond rate is denoted by the 10-year bond interest rate for every nation. Inflation is measured the quarterly average of inflation rates for each country and the growth rate of GDP is represented in the real GDP yearly growth rate denoted in each country. Note that each explanatory variables utilised in this case is lagged by one quarter. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively. Stata 12 was employed in order to obtain results regarding the GMM method through 'Xtabond 2' requirement as highlighted by Roodman (2009).

Table 5: The effect of monetary policy on bank's credit standards during the crisis (2008:Q4-2010:Q4)

	Total Lending Standards			Total Lending Standards from Balance Sheet Factors				
				Business Loans			**Mortgage Loans**	**Consumer Loans**
	Business Loans	Mortgage Loans	Consumer Loans	Bank's Capital Position	Bank's Market Financing	Bank's Liquidity Position	All Factors	All Factors
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Taylor rule residuals $_{i,t-1}$	3.181	-4.318	4.606	2.803	2.201	0.866	-8.892***	-0.508
	(0.88)	(-0.83)	(1.06)	(1.54)	(1.71)	(0.34)	(-3.66)	(-0.15)
Demand for Loans $_{i, t-1}$	0.0963	-0.0207	0.0395	0.0341	0.102	-0.0425	-0.233**	0.100
	(1.17)	(-0.19)	(0.27)	(0.56)	(1.94)	(-0.39)	(-2.78)	(1.41)
10 Year bond Rate $_{i, t-1}$	4.648	-5.336	4.237	2.790	1.990	-1.570	-6.352	0.415
	(0.89)	(-0.97)	(1.41)	(1.08)	(0.81)	(-0.45)	(-1.57)	(0.15)
Inflation rate $_{i, t-1}$	6.251*	3.986	-2.195	3.253	4.471	6.848***	0.359	1.012
	(2.04)	(1.31)	(-0.77)	(1.84)	(1.85)	(3.33)	(0.20)	(0.48)
GDP growth rate $_{i, t-1}$	0.476	-2.004	2.208	0.219	0.397	1.214	-2.374	1.134
	(0.50)	(-1.76)	(1.28)	(0.27)	(0.44)	(0.72)	(-1.23)	(0.76)
Lagged Dependent $_{i, t-1}$	0.279**	0.346	0.213	-0.0253	0.0839	0.102	0.270***	0.191
	(2.58)	(1.74)	(0.86)	(-0.21)	(0.77)	(1.45)	(3.57)	(1.65)
Country fixed effect	yes	yes	yes	yes	yes	yes	yes	yes
No of observations	74	74	74	74	74	74	74	74
No of countries	9	9	9	9	9	9	9	9
AR(2) p-value	0.071	0.168	0.400	0.764	0.555	0.982	0.312	0.252
p(Sargan)	0.033	0.279	0.068	0.025	0.036	0.019	0.044	0.386

Table 5 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified via total lending standards, estimated through the net percentage from banks from every one of the nations belonging to the EU-9 which describes tightening of credit standards when considering the preceding quarter. Responses to Question 1 and 8 are outlined in the BLS presented in column 1-3. Similarly, the dependant variable described by total lending standards due to balance sheet factors noted in columns (4-8) is measured by the net percentage of banks reporting a tightening of credit standards as a result of cost of funds and balance sheet constraints comprising three components which are as follows: cost related to the bank's capital position, bank's ability to access market financing and bank's liquidity position. These are specific for business loans, and all factors related to balance sheet constraints for both mortgage and consumer loans. Additionally, these are solutions to Questions 2, 9 and 11 detailed within the BLS. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame during the financial crisis (2008:Q4-2010Q4. Additionally the demand for loans is represented via the net percentage of banks documenting a rise in demand regarding business, mortgage and consumer loans (Question 4 and 13 in the BLS). Long term national government bond rate is denoted by the 10-year bond interest rate for every nation. Inflation is measured the quarterly average of inflation rates for each country and the growth rate of GDP is represented in the real GDP yearly growth rate denoted in each country. Note that each explanatory variables utilised in this case is lagged by one quarter. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively. Stata 12 was employed in order to obtain results regarding the GMM method through 'Xtabond 2' requirement as highlighted by Roodman (2009).

Table 6: The effect of monetary policy on bank's credit standards after the crisis (2011:Q1-2014:Q4)

	Total Lending Standards			Total Lending Standards from Balance Sheet Factors				
				Business Loans			**Mortgage Loans**	**Consumer Loans**
	Business Loans	Mortgage Loans	Consumer Loans	Bank's Capital Position	Bank's Market Financing	Bank's Liquidity Position	All Factors	All Factors
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Taylor rule residuals $_{i,t-1}$	10.00**	8.645	-2.030	3.911	10.24	9.320	13.08	3.832
	(2.90)	(1.49)	(-0.72)	(1.27)	(1.75)	(1.66)	(1.71)	(0.77)
Demand for Loans $_{i, t-1}$	-0.127	-0.0328	-0.0761	0.0358	-0.0389	-0.105	-0.0848	-0.0526
	(-1.43)	(-0.70)	(-1.79)	(1.13)	(-0.79)	(-1.57)	(-1.05)	(-0.87)
10 Year bond Rate $_{i, t-1}$	-0.131	-0.276	0.978	1.256	1.596	0.664	0.161	-0.886
	(-0.12)	(-0.30)	(1.65)	(1.77)	(1.80)	(0.63)	(0.20)	(-1.13)
Inflation rate $_{i, t-1}$	6.368***	7.270**	1.512	2.212	1.683	3.754	4.503	1.457
	(3.49)	(2.96)	(0.95)	(1.86)	(0.99)	(1.11)	(1.81)	(1.03)
GDP growth rate $_{i, t-1}$	3.252**	1.872	2.655*	1.778	3.361**	3.492*	1.344	0.598
	(2.90)	(1.22)	(2.30)	(1.81)	(2.87)	(2.18)	(0.98)	(0.66)
Lagged Dependent $_{i, t-1}$	0.434**	0.340*	0.475*	0.611***	0.536***	0.533**	0.406*	0.765***
	(2.70)	(2.19)	(2.27)	(3.94)	(4.85)	(3.01)	(2.47)	(5.30)
Country fixed effect	yes	yes	yes	yes	yes	yes	yes	yes
No of observations	142	142	142	142	142	142	142	142
No of countries	9	9	9	9	9	9	9	9
AR(2) p-value	0.493	0.331	0.815	0.155	0.649	0.656	0.412	0.113
p(Sargan)	0.063	0.167	0.046	0.193	0.114	0.025	0.088	0.181

Table 6 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified via total lending standards, estimated through the net percentage from banks from every one of the nations belonging to the EU-9 which describes tightening of credit standards when considering the preceding quarter. Responses to Question 1 and 8 are outlined in the BLS presented in column 1-3. . Similarly, the dependant variable described by total lending standards due to balance sheet factors noted in columns (4-8) is measured by the net percentage of banks reporting a tightening of credit standards as a result of cost of funds and balance sheet constraints comprising three components which are as follows: cost related to the bank's capital position, bank's ability to access market financing and bank's liquidity position. These are specific for business loans, and all factors related to balance sheet constraints for both mortgage and consumer loans. Additionally, these are solutions to Questions 2, 9 and 11 detailed within the BLS. The Taylor residuals are characterised as the residuals of the regression of EONIA rates on both the growth rates of GDP and inflation rates encompassing the time frame after the financial crisis (2011:Q1-2014Q4). Additionally the demand for loans is represented via the net percentage of banks documenting a rise in demand regarding business, mortgage and consumer loans (Question 4 and 13 in the BLS). Long term national government bond rate is denoted by the 10-year bond interest rate for every nation. Inflation is measured the quarterly average of inflation rates for each country and the growth rate of GDP is represented in the real GDP yearly growth rate denoted in each country. Note that each explanatory variables utilised in this case is lagged by one quarter. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively. Stata 12 was employed in order to obtain results regarding the GMM method through 'Xtabond 2' requirement as highlighted by Roodman (2009).

3.4.4 Monetary policy and the "*risk-taking channel*"

Tables 7 and 8 highlight the outcomes of the regressions where the dependent variables are categorised as banks' conditions and terms regarding authorising loans or credit lines in conjunction with the aforementioned types of loans designed precisely for the time frame prior to and also following the financial turmoil.

Of particular note is that low short-term monetary policy rates exert a substantial softening effect on margins (lending rates) specific for both average and riskier loans in each of the three loan categories with the most significant effect observed in consumer credit and other lending.

Consequently, this implies that prior to the beginning to the crisis, characterised by reduced monetary rates, banks relaxed margins on loans, a practice which unexpectedly included borrowers that were perceived as riskier; however, the post-financial crisis period reduced the effectiveness of low short-term policy rates, especially concerning the margin on riskier loans to enterprises and consumer credit. The aforementioned conclusions are supported by the findings in Rajan (2006), and Borio and Zhu (2012) clarifying and justifying the risk-taking approach in an environment of low interest rates. The policy rates have an additional significant softening impact on the size of the loans or credit line and collateral requirements for enterprises loans. Furthermore, the low policy stance influence collateral requirements and loan to value ratio (LTV ratio) specifically concerning mortgage loans, and ultimately effects collateral requirements for consumer credit and other lending.

The results support that increased credit risk is assumed by banks when approving and issuing new loans during periods of low monetary policy rates, especially prior to the onset of the crisis within the selection in question. Accordingly, the post-crisis outcomes imply that negative Taylor-rule residuals have an additional effect on the size of loans for

enterprises loans, a possible result of the scope of expansionary monetary policy carried out within the euro area. Moreover, it has increased the maturity of loans for mortgage loans.

Table 7: Pre Crisis Results

	Business Loans							Mortgage Loans						Consumer Credit & Other Lending				
	Margin on Average Loans	Margin on Riskier Loans	Non-interest Rates Charges	Size of Loan or/ Credit line	Collateral requirements	Loan covenants	Maturity	Margin on Average Loans	Margin on Riskier Loans	Collateral requirements	"Loan-to-value" ratio	Maturity	Non-interest rates Charges	Margin on Average Loans	Margin on Riskier Loans	Collateral requirements	Maturity	Non-interest rates Charges
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Taylor rule residuals $_{i,t-1}$	12.35*	7.920**	0.245	4.534*	6.697*	3.781	5.835	8.640***	6.287*	2.678*	5.975*	0.224	-3.209	8.235***	4.412**	3.643*	1.042	-1.047
	(2.52)	(2.90)	(0.12)	(2.03)	(2.39)	(1.28)	(1.87)	(3.36)	(2.54)	(2.11)	(2.56)	(0.12)	(-1.63)	(4.09)	(2.97)	(2.26)	(0.40)	(-0.36)
Demand for Loans $_{i, t-1}$	-0.0673	-0.0978	0.0731	-0.0289	-0.0243	-0.00761	-0.0688	-0.0735	-0.0394	-0.0186	-0.0512*	-0.08***	-0.0455	0.0014	-0.0932*	-0.0251	0.0148	-0.013
	(-0.98)	(-1.38)	(1.47)	(-0.84)	(-0.35)	(-0.16)	(-1.48)	(-1.56)	(-0.99)	(-1.65)	(-2.00)	(-5.91)	(-1.52)	(0.02)	(-2.37)	(-0.46)	(0.31)	(-0.43)
10 Year bond Rate $_{i, t-1}$	14.62*	11.26*	10.08**	6.632	4.726	8.532*	9.346*	4.828	7.213	1.621	-0.819	1.454	9.559	7.693	8.675*	4.002	5.565	6.848
	(2.28)	(2.54)	(3.29)	(1.92)	(1.29)	(2.15)	(2.38)	(1.01)	(1.76)	(0.87)	(-0.29)	(0.65)	(1.96)	(1.21)	(2.18)	(1.58)	(1.52)	(1.73)
Inflation rate $_{i, t-1}$	9.317***	8.458***	2.275	5.237***	6.061*	5.023**	4.960*	2.115	5.448	1.519*	1.103	0.314	-1.231	6.277*	6.865**	1.800*	2.613*	1.512
	(3.34)	(3.52)	(1.72)	(5.72)	(2.35)	(3.21)	(2.52)	(0.61)	(1.87)	(2.02)	(0.59)	(0.16)	(-1.21)	(2.44)	(3.19)	(2.05)	(2.03)	(1.31)
GDP growth rate $_{i, t-1}$	0.585	-0.370	0.328	-0.696	-0.526	0.0200	-0.189	0.381	-1.321	-0.546	-1.155	-0.505	-0.481	-0.779	-0.831	-1.474	-1.422*	0.409
	(0.31)	(-0.34)	(0.29)	(-1.02)	(-0.74)	(0.03)	(-0.21)	(0.33)	(-1.13)	(-0.92)	(-1.08)	(-0.65)	(-0.65)	(-0.56)	(-1.11)	(-1.45)	(-2.14)	(0.88)
Lagged Dependent $_{i, t-1}$	0.533***	0.448***	0.581***	0.462***	0.593***	0.533***	0.406***	0.508***	0.421***	0.515***	0.478***	0.285***	0.372**	0.306**	0.369***	0.311***	0.272*	0.260*
	(7.22)	(4.74)	(7.58)	(7.51)	(8.41)	(11.34)	(4.58)	(3.94)	(3.69)	(4.48)	(3.75)	(5.39)	(2.98)	(3.05)	(3.70)	(6.29)	(2.34)	(2.37)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
No of countries	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
AR(2) p-value	0.259	0.273	0.903	0.719	0.704	0.460	0.852	0.704	0.158	0.112	0.215	0.340	0.230	0.369	0.726	0.374	0.313	0.405
p(Sargan)	0.296	0.304	0.187	0.582	0.245	0.507	0.505	0.025	0.339	0.640	0.394	0.284	0.154	0.029	0.290	0.584	0.091	0.506

Table 7 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified through the net percentage from banks from every one of the nations belonging to the EU-9, reporting a tightening of the terms and conditions for approving loans or credit lines to three elements included in the BLS, which are as follows: *enterprises* (columns 1–7), *households* (columns 8–13) and *consumer credits* (columns 14–18), while factoring the preceding quarter. There are the responses to Question 3, 10 and 12 as outlined in the BLS. We have a balanced panel dataset which incorporates 9 Euro-area nations: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain. We estimate the panel regression over the pre-crisis period from 2002:Q3-2008:Q3. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table 8: Post Crisis Results

	Business Loans							Mortgage Loans						Consumer Credit & Other Lending				
	Margin on Average Loans	Margin on Riskier Loans	Non-interest Rates Charges	Size of Loan or/ Credit line	Collateral requirements	Loan covenants	Maturity	Margin on Average Loans	Margin on Riskier Loans	Collateral requirements	"Loan-to-value" ratio	Maturity	Non-interest rates Charges	Margin on Average Loans	Margin on Riskier Loans	Collateral requirements	Maturity	Non-interest rates Charges
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Taylor rule residuals $_{i,t-1}$	18.98	10.55*	0.801	12.50**	-0.480	3.262	2.067	9.029	10.53	-1.878	5.212	6.126*	1.242	4.111	4.544	-2.065	-1.916	-2.849
	(1.87)	(2.03)	(0.08)	(2.76)	(-0.11)	(0.98)	(0.57)	(0.78)	(1.24)	(-0.60)	(0.98)	(2.47)	(0.22)	(1.28)	(1.49)	(-0.48)	(-0.47)	(-1.24)
Demand for Loans $_{i, t-1}$	-0.0640	-0.0275	-0.0116	-0.0366	-0.162**	-0.120	0.0146	0.146*	0.0311	0.0175	0.0284	-0.0246	0.0179	-0.149***	-0.0422	0.0628	-0.0390	-0.125
	(-0.48)	(-0.26)	(-0.11)	(-0.59)	(-2.65)	(-1.50)	(0.17)	(2.43)	(0.56)	(0.54)	(0.48)	(-0.64)	(0.71)	(-3.88)	(-0.60)	(0.95)	(-1.47)	(-1.58)
10 Year bond Rate $_{i, t-1}$	-0.806	0.152	-0.804	-0.453	-0.419	-0.447	-1.303	-1.371	0.692	0.740	0.192	-0.938	-0.634	0.482	1.129*	0.194	-0.471	-0.164
	(-0.76)	(0.18)	(-1.91)	(-0.58)	(-1.28)	(-0.89)	(-1.82)	(-1.70)	(1.10)	(1.05)	(0.27)	(-1.76)	(-1.18)	(0.91)	(2.12)	(0.53)	(-1.25)	(-0.23)
Inflation rate $_{i, t-1}$	8.967**	9.456***	4.020**	6.734***	4.932***	5.949***	6.241***	9.516***	7.588***	0.836	3.787*	2.710**	2.575**	3.509*	3.136*	0.583	0.379	0.320
	(3.05)	(6.03)	(3.26)	(4.40)	(3.56)	(3.52)	(4.39)	(3.95)	(4.05)	(0.60)	(2.29)	(2.82)	(2.61)	(2.34)	(2.36)	(0.41)	(0.42)	(0.28)
GDP growth rate $_{i, t-1}$	4.482***	2.253*	0.932	0.867	1.689	1.255**	0.964	-0.0829	0.541	-0.303	-0.509	0.906	-0.304	1.944*	1.349	-0.377	0.224	1.476
	(3.76)	(2.53)	(1.03)	(1.47)	(1.69)	(2.67)	(1.79)	(-0.07)	(0.49)	(-0.39)	(-0.43)	(1.82)	(-0.67)	(2.12)	(1.48)	(-0.82)	(0.50)	(1.65)
Lagged Dependent $_{i, t-1}$	0.741***	0.450***	0.513***	0.532***	0.449***	0.360***	0.596***	0.592***	0.343**	0.324	0.386	0.502***	0.541***	0.397*	0.417*	0.709**	0.514***	0.526***
	(7.69)	(4.31)	(3.74)	(3.87)	(4.73)	(4.29)	(8.67)	(4.55)	(3.02)	(1.73)	(1.79)	(3.90)	(3.65)	(2.17)	(2.36)	(2.79)	(3.56)	(12.39)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142
No of countries	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
AR(2) p-value	0.492	0.574	0.602	0.327	0.624	0.684	0.401	0.277	0.322	0.486	0.612	0.815	0.697	0.285	0.344	0.189	0.835	0.225
p(Sargan)	0.014	0.147	0.222	0.018	0.068	0.005	0.018	0.041	0.027	0.010	0.353	0.054	0.019	0.159	0.113	0.001	0.020	0.000

Table 8 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified through the net percentage from banks from every one of the nations belonging to the EU-9, reporting a tightening of the terms and conditions for approving loans or credit lines to three elements included in the BLS, which are as follows: *enterprises* (columns 1–7), *households* (columns 8–13) and *consumer credits* (columns 14–18), while factoring the preceding quarter. There are the responses to Question 3, 10 and 12 as outlined in the BLS. We have a balanced panel dataset which incorporates 9 Euro-area nations: Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal and Spain. We estimate the panel regression over the post-crisis period from 2011:Q1-2014:Q4. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

3.4.5 Bank risk-taking behaviour in core vs. periphery countries

In Tables 9 and 10, this present investigation is further progressed by estimating twelve distinct regressions with the purpose of analysing the concept of *'excessive'* risk-taking—naturally factoring in the stipulation that determining excessive risk is an exceedingly challenging undertaking, which is supported in Maddaloni and Peydro (2013). The objective of this undertaking is to identify potential risk-taking behaviour by banks prior to and after the onset of recent crisis. As a result we regroup the designated nations within the original sample in line with both the impact and the severity of the financial crisis into two panels of A and B. Panel A comprises Greece, Spain, Italy and Portugal, whereas Panel B consists of Belgium, France, Germany, Luxembourg and the Netherlands.

We first regress banks' margins as *applied to riskier loans* on Taylor-rule residuals in addition to further macro measurements concerning the three loan types. Then further regressions are conducted to control for the variations in lending conditions as a result of changes in borrowers' net worth directly from the BLS and other control variables. It is important to mention that banks' credit standards can be tightened due to a rise in perception of risk as a result of the issues outlined here: *expectation regarding the economic activity, industry or firm specific outlook and risk on collateral demanded* with reference to enterprises loans (see BLS. Question. 2), *housing market prospects for household loans* (see BLS. Question. 9) and *creditworthiness of consumer credit and other lending* (see BLS. Question. 11).

When examining the outcome of the pre-crisis selection from stressed and non-stressed countries of the EU-9, it can be deduced that the coefficient of Taylor-rule residuals for the regression utilising banks' conditions and terms for approving loans or credit lines within the three categories of loans remains significant; this is especially prevalent when analysing stressed countries relative to non-stressed countries. The significance of the

coefficient implies that prior to the commencement of the crisis, banks surprisingly relaxed margins for loans to borrowers perceived as riskier, in an environment of low monetary rates. These results uphold the previous findings by Jimenez *et al.* (2014) and Ioannidou *et al.* (2015). Accordingly, this conclusion is robust to the incorporation of the pertinent interest rates, i.e. the 10 year government bond rates, most specifically in the non-stressed nation prior to onset of crisis. The selection in the post-crisis sample indicates a reduction in the effect of low policy rates on softening household and consumer loans in non-stressed nations. However, in stressed nations the data indicates that excessive risk-taking in bank lending behaviour occurred, particularly during periods of low monetary policy rates both pre- and post-crisis.

Table 9: Before and After Crisis (Non-stressed Countries)

	Before						After					
	Business Loans		Mortgage Loans		Consumer Credit & Other Lending		Business Loans		Mortgage Loans		Consumer Credit & Other Lending	
	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Taylor rule residuals $_{i,t-1}$	12.57***	10.87**	3.669	4.678*	3.092*	3.602**	22.70**	22.72**	3.137	10.87	3.013	3.541
	(3.73)	(2.92)	(1.81)	(2.56)	(2.14)	(2.69)	(2.87)	(2.89)	(0.15)	(0.61)	(0.37)	(0.36)
Demand for Loans $_{i, t-1}$	-0.159*	-0.0796	-0.110*	-0.0965*	-0.0718*	-0.0368	-0.295***	-0.261***	0.0240	0.0174	0.0223	0.0257
	(-2.08)	(-1.39)	(-2.40)	(-2.32)	(-2.08)	(-1.64)	(-3.90)	(-3.79)	(0.83)	(0.56)	(0.50)	(0.60)
10 Year bond Rate $_{i, t-1}$	9.762	12.91	11.34***	10.58**	12.15***	11.81***	-2.435	-2.107	0.192	1.295	-4.876	-4.258
	(1.55)	(1.89)	(3.42)	(2.91)	(3.48)	(3.34)	(-0.51)	(-0.42)	(0.02)	(0.18)	(-1.58)	(-1.64)
Inflation rate $_{i, t-1}$	10.47**	10.41**	4.270	4.132	5.361*	6.521*	15.27***	15.43***	5.668	5.964	5.872	5.773
	(3.09)	(2.98)	(1.46)	(1.41)	(2.50)	(2.35)	(5.17)	(3.73)	(0.83)	(0.86)	(1.85)	(1.80)
GDP growth rate $_{i, t-1}$	-1.313	-0.247	-3.833***	-3.136**	-1.494*	-0.498	1.217	1.099	-2.219	-0.719	0.263	0.008
	(-0.89)	(-0.16)	(-4.05)	(-3.09)	(-2.18)	(-1.04)	(0.95)	(1.24)	(-0.83)	(-0.43)	(0.25)	(0.01)
Expectations regarding general economic activity $_{i, t-1}$		0.305*		-0.006		0.302		0.237		0.290		-0.0110
		(2.16)		(-0.05)		(1.89)		(0.89)		(1.36)		(-0.13)
Industry or firm-specific outlook $_{i, t-1}$		-0.0769						-0.0666				
		(-0.53)						(-0.30)				
Risk on the collateral demanded $_{i, t-1}$		0.203				-0.265		-0.0354				0.171
		(1.86)				(-1.29)		(-0.15)				(0.52)
Housing market prospects $_{i, t-1}$				0.168***						0.184		
				(4.36)						(1.10)		
Creditworthiness of consumers $_{i, t-1}$						0.0687						-0.0853**
						(0.65)						(-2.96)
Lagged Dependent $_{i, t-1}$	0.337**	0.164	0.128	0.0916	0.139	0.0726	0.252**	0.184	0.207***	0.197***	-0.256**	-0.253*
	(2.71)	(1.41)	(1.53)	(1.22)	(1.37)	(0.70)	(3.25)	(1.78)	(11.84)	(6.61)	(-3.10)	(-2.23)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	114	114	114	114	114	114	78	78	78	78	78	78
No of countries	5	5	5	5	5	5	5	5	5	5	5	5
AR(2) p-value	0.660	0.937	0.139	0.227	0.734	0.963	0.580	0.827	0.088	0.082	0.234	0.111
p(Sargan)	0.401	0.282	0.058	0.030	0.045	0.022	0.714	0.247	0.087	0.117	0.421	0.350

Table 9 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified through the net percentage from banks from every one of the nations belonging to the EU-9, reporting a tightening of the terms and conditions for approving loans or credit lines to three elements included in the BLS. We have a balanced panel dataset which incorporates 5 Euro-area nations: Belgium, France, Germany, Luxembourg and Netherlands. We estimate the panel regression over both pre and post crisis period .The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

Table 10: Before and After Crisis (Stressed Countries)

	Before						After					
	Business Loans		Mortgage Loans		Consumer Credit & Other Lending		Business Loans		Mortgage Loans		Consumer Credit & Other Lending	
	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans	Margin on Riskier Loans
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Taylor rule residuals $_{i,t-1}$	6.722***	5.956**	11.95***	13.47***	6.380*	8.758***	6.738	13.11	20.56*	22.27	17.05***	21.56***
	(3.58)	(3.07)	(3.71)	(4.47)	(2.49)	(5.45)	(0.74)	(1.46)	(2.07)	(1.92)	(3.59)	(9.74)
Demand for Loans $_{i, t-1}$	-0.0476	0.0351	0.0307	0.0314	-0.102*	-0.0362	0.127	0.0744	-0.0129	0.0573	-0.0926***	-0.234***
	(-0.46)	(0.42)	(0.62)	(0.51)	(-2.04)	(-1.20)	(1.56)	(1.18)	(-0.13)	(0.35)	(-4.67)	(-4.27)
10 Year bond Rate $_{i, t-1}$	8.656*	7.303	6.914	6.338	6.868	2.051	0.708	0.824	0.633	1.050**	-0.726	0.0882
	(2.10)	(1.74)	(1.03)	(0.98)	(0.95)	(0.37)	(0.58)	(0.78)	(0.98)	(3.00)	(-1.20)	(0.14)
Inflation rate $_{i, t-1}$	7.202**	5.456*	9.081	8.786	9.990*	12.07***	13.48***	10.58*	16.25***	15.71***	12.76***	9.106***
	(3.09)	(2.00)	(1.54)	(1.48)	(2.15)	(3.44)	(3.71)	(2.18)	(6.48)	(8.53)	(3.58)	(5.57)
GDP growth rate $_{i, t-1}$	0.699	0.815	0.668	0.371	-0.110	-1.101	3.674*	3.667**	4.362***	4.821***	2.199*	4.496**
	(0.69)	(0.63)	(0.41)	(0.21)	(-0.08)	(-0.75)	(2.50)	(2.96)	(4.68)	(5.92)	(2.44)	(2.86)
Expectations regarding general economic activity $_{i, t-1}$		0.109		0.0725		0.544**		0.340		0.0169		-0.0253
		(1.47)		(1.10)		(2.77)		(1.23)		(0.12)		(-0.10)
Industry or firm-specific outlook $_{i, t-1}$		0.0131						-0.311				
		(0.09)						(-1.88)				
Risk on the collateral demanded $_{i, t-1}$		0.171*				-0.0177		0.201				0.299***
		(2.44)				(-0.12)		(1.13)				(4.06)
Housing market prospects $_{i, t-1}$				-0.0431						0.320*		
				(-1.96)						(2.39)		
Creditworthiness of consumers $_{i, t-1}$						-0.372**						0.176
						(-2.99)						(0.78)
Lagged Dependent $_{i, t-1}$	0.542***	0.413***	0.454***	0.398***	0.408**	0.139	0.346**	0.336**	0.142	0.0152	0.255**	-0.104
	(8.15)	(3.34)	(4.09)	(5.04)	(3.00)	(0.77)	(2.82)	(2.62)	(0.80)	(0.15)	(2.85)	(-0.54)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	96	95	96	95	96	95	64	63	64	63	64	63
No of countries	4	4	4	4	4	4	4	4	4	4	4	4
AR(2) p-value	0.219	0.232	0.749	0.544	0.305	0.443	0.473	0.203	0.618	0.672	0.652	0.489
p(Sargan)	0.431	0.393	0.097	0.052	0.424	0.368	0.011	0.025	0.017	0.016	0.172	0.117

Table 10 illustrates the results of a GMM dynamic panel estimation in which the dependant variable is specified through the net percentage from banks from every one of the nations belonging to the EU-9, reporting a tightening of the terms and conditions for approving loans or credit lines to three elements included in the BLS. We have a balanced panel dataset which incorporates 4 Euro-area nations: Greece, Italy, Portugal and Spain. We estimate the panel regression over both pre and post crisis period. The symbols ***, **, and * indicates significance levels of a statistic at the 1%, 5%, and 10% respectively.

3.4.6 The effectiveness of the ECB's 3 year LTROs

In this section an analytical investigation of the outcomes for the BLS in EU-9 is conducted, encompassing the period 2012Q1 to 2014Q4. The basis of this approach is to determine the effectiveness of the ECB's 3 year LTROs with the purpose of learning if the measurements exerted the impact they were intended to.

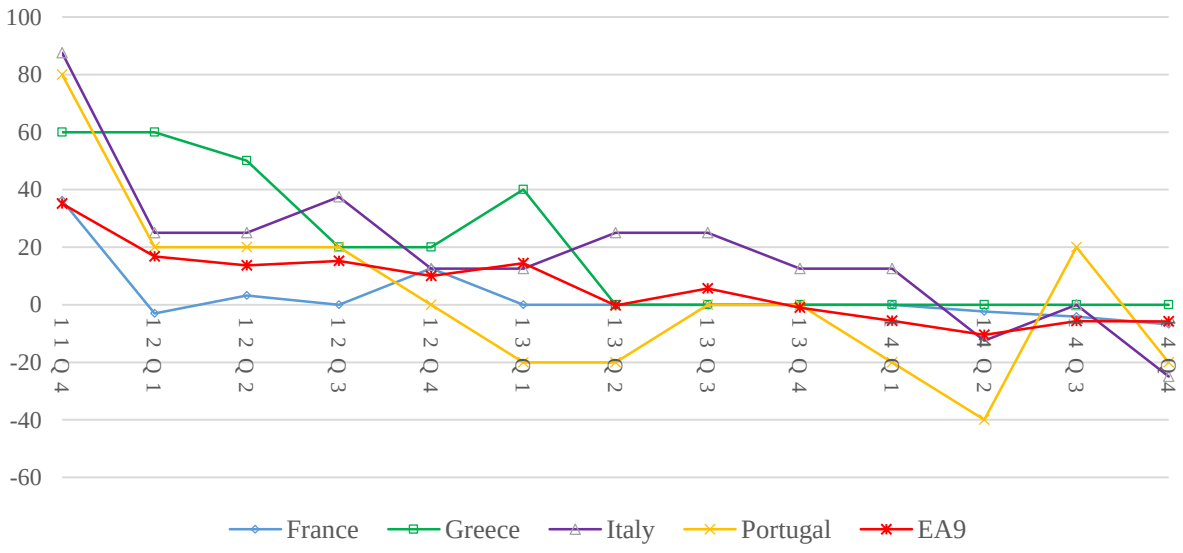
As illustrated by Figure 5, banks' credit standards for business loans were relaxed in EU-9 countries following the execution of these LTROs. In particular this observation applies to the first quarter of 2012, in which out of the total bank participants in the survey, just 17% noted a constriction in the accessibility of loans or credit lines to enterprises in contrast to a significantly higher proportion of 36% seen in the preceding quarter.

Although this measure stays constricted till the final quarter in 2013, it is substantially more gradual in its development than previous quarters. Accordingly, this progress is probably propelled through more moderate demand on banks stemming from the cost of funds and balance sheet constraints, reflected in Figure 7. Here it can be inferred that costs related to a bank's capital position in addition to a bank's ability to access market financing show significant constrictions before 2012Q1. However, the ECB's €1 trillion cheap loan scheme has achieved its anticipated impact in substantially aiding the relaxation of the previously mentioned issues.

Furthermore, banks' liquidity positions saw additional progress within the course of this period. Here it is crucial to highlight that the pattern of credit standards for business loans reflects further relaxation in nearly all EU-9 countries. The country analysis indicates that particularly Italy, Portugal and Greece experienced a marked elevation of bank credit. Net tightening of banks' credit standards as applied to the approval of loans available in the two components to households for house purchase and consumer credit and other lending also experienced a substantial decline within same period. Even though the

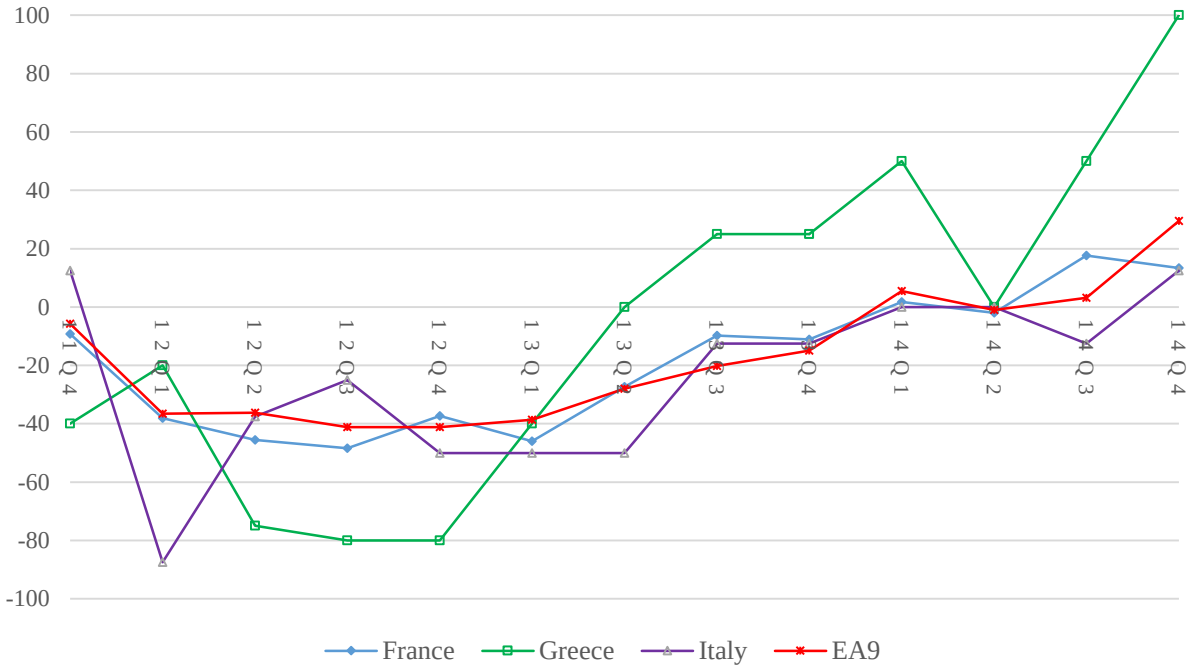
progressive decrease in bank credit constriction is reassuring and necessary in order to dilute the devastating impact of the latest financial turmoil, the benefits of such action can only be experienced in the EU-9 economy with a concurrent increase in net demand. Correspondingly, research by Popov and Van Horen (2015) details that the reduced rate of lending persisted, following the ECB's LTRO in December 2011 and these measures evidently failed to stop the total reduction in bank lending in the euro area. An analysis of Figures 6 and 8-9 indicates a substantial decline in the demand for loans to enterprises, households and consumer credit. Certainly the net percentage of banks announcing decreased demand from enterprises in EU-9 fell from -6% in 2011Q4 to -42% in 2012Q4. Such a significant fall in demand is justified through enterprises being reluctant to invest while the Eurozone crisis progressed with increasing concerns of falling into a recession; this was especially the case in strained EU-9 nations. However, banks' credit demand eventually began to increase starting from 2013Q1 to the final quarter of 2014, which implies that the inclination of enterprises to invest, housing market outlook and consumer confidence are largely increasing, especially in the EU-9 periphery countries this progress is comparable to the banks' credit standards within the analogous period.

Figure 5: Credit Standards for Business Loans



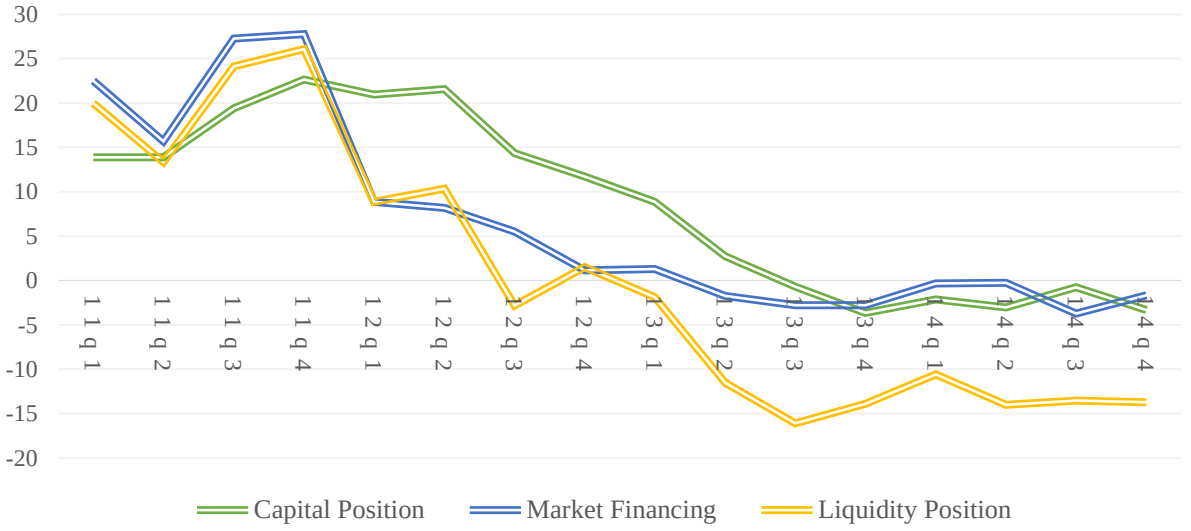
Source: (BLS, 2015)

Figure 6: Net Demand for Business Loans



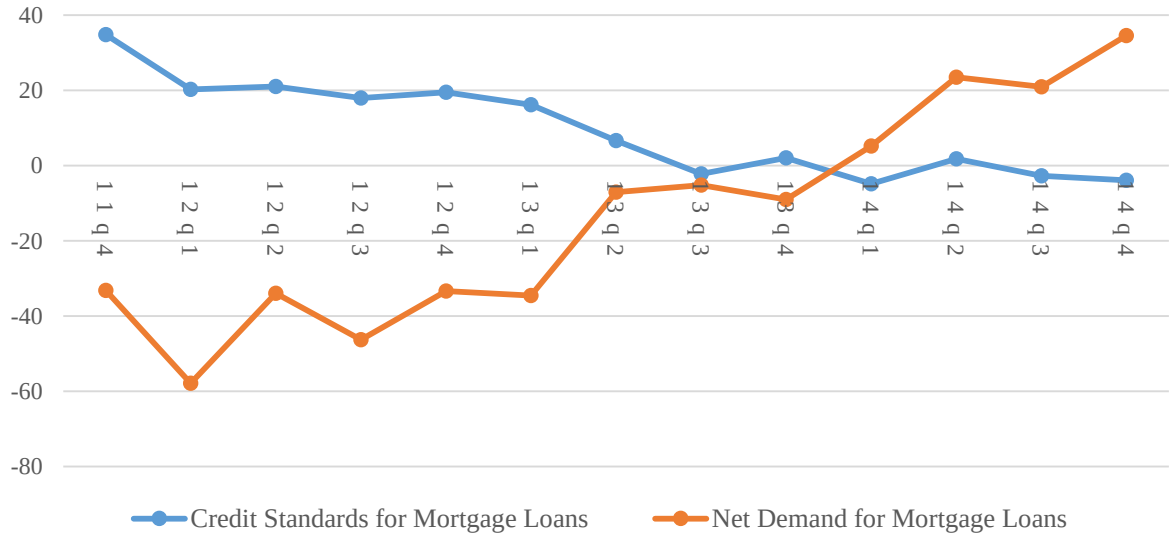
Source: (BLS, 2015)

Figure 7: Factors influencing Credit standards for Business Loans



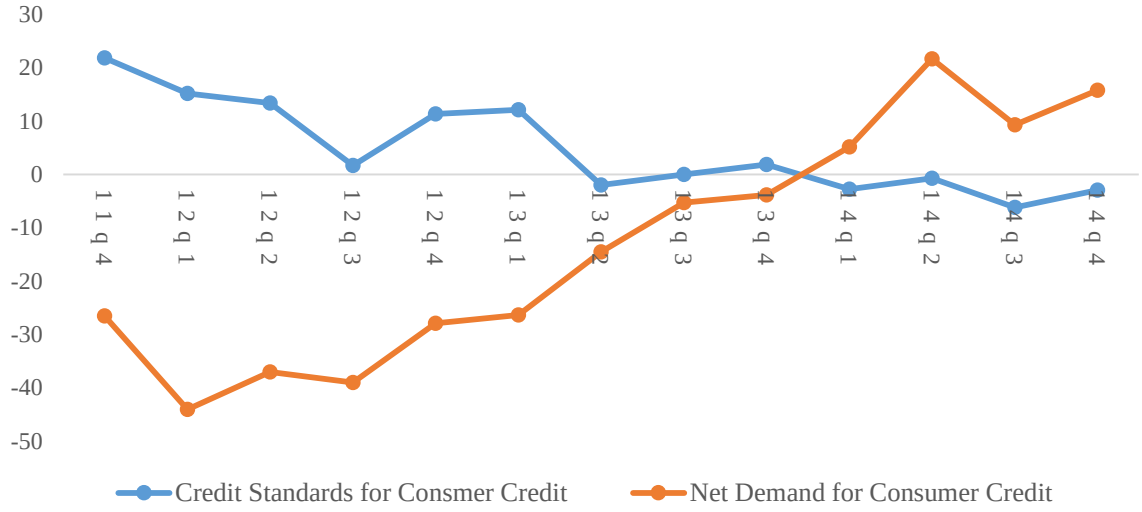
Source: (BLS, 2015)

Figure 8: Credit Standards vs Net Demand for Mortgage Loans



Source: (BLS, 2015)

Figure 9: Credit Standards vs Net Demand for Consumer Credit



Source: (BLS, 2015)

3.5 Conclusion

The 2007-8 financial turmoil has exerted a negative influence on bank lending within the primary industrialised nations, in addition to the euro area. As a result this has brought attention to the issue concerning the proclivity of economic entities to take on further risk especially during periods of low interest rates. Moreover, when considering the practice of cautious lending in banks which are reluctant to intensify lending activity and volume regardless of the monetary policy stance, with the purpose of enabling bank lending, the ECB initiated a 3 year LTROs in which a combined sum of €1 trillion cheap loans was injected into the EU banking system. In this chapter these topics are extensively examined in 9 countries of the euro area.

We find robust supporting data that low-short term interest rates prior to the crisis induced an inconsistent loosening of credit standards regarding enterprises, household and consumer loans. From the data analysis it can be determined that higher rates of GDP growth are connected with the softening of total lending standards, particularly in the pre-crisis sample, verifying the position taken in Maddaloni and Peydro (2011) which characterises banks' credit standards as '*pro-cyclical*'. Moreover, 10-year government bond rates are mainly statistically insignificant, highlighting that lending standards are unaffected by long-term national interest rates. Despite the scope of expansionary monetary policy reported mainly in the post-crisis sample, this analysis indicates that negative Taylor-rule residuals resulted solely in softening of total lending standards for enterprises loans.

The implementation of the 3 years LTRO by the ECB caused a decrease of the development of banks' credit constriction, which is reassuring and necessary in order to avoid the likely damaging outcomes of the latest financial crisis. Nevertheless, the benefits of this scheme have yet to be experienced within the EU-9 real economy

considering the disadvantageous decline in demand for all three types of loans. However, the demand eventually began to increase in 2013Q1 till the final quartering of 2014, indicating an encouraging inclination by enterprises to invest. In addition, housing market outlook and consumer confidence are starting to increase, which has not occurred since the commencement of the credit crunch. Additionally, the recent TLTRO scheme implemented by the ECB is geared towards enabling increased access to cheap financing for SME lending.

Especially noteworthy are the results from before the onset of the crisis, which indicate that banks unexpectedly relaxed margins for loans to borrowers considered as riskier, in an environment of low monetary rates within stressed and non-stressed nations of the sample investigated. Yet, in stressed nations the data suggests that excessive risk-taking in bank lending behaviour transpired, especially during periods of low monetary policy rates both pre- and post-crisis. Such recklessness should be an important issue for policy makers to note and should be comprehensively tackled in the formulation of future policies.

Appendices to Chapter 3

Appendix A

Table A1: Summary Statistics: Bank Lending Survey Indicators and Financial Indicators

Before the Start of the Financial Crisis (2002:Q4-2008:Q3)	Mean	Std.Dev.	Min	Max	Obs
Lending Standards:					
Business Loans	17.75	31.28	-50	100	216
Mortgage Loans	4.61	27.98	-66.67	100	216
Consumer Credit Loans	6.95	24.22	-35.71	100	216
Demand for Loans:					
Business Loans	2.89	30	-83.33	71.43	216
Mortgage Loans	5.17	45.98	-100	100	216
Consumer Credit Loans	6.34	30.48	-100	100	216
Lending Standards Due to Balance Sheet Factors:					
Bank Capital Position	12.51	17.50	-25	80	216
Bank Liquidity Position	4.25	13.37	-33.33	51.20	216
Bank Market Financing	6.92	18.92	-40.00	100	216
All Balance Sheet Factors for Mortgage Loans	4.96	15.30	-66.67	80	216
All Balance Sheet Factors for Consumer Credit Loans	4.37	16.98	-33.33	100	216
Perception of Risk:					
Expectations regarding general economic activity	23.52	33.45	-42.86	100	216
Industry or firm-specific outlook	29.16	33.45	-28.57	100	216
Risk on the collateral demanded	12.52	19.75	-20	80	216
Expectations regarding general economic activity	12.83	24.20	-40	100	216
Housing market prospects	14.80	26.59	-33.33	100	216
Expectations regarding general economic activity	11.86	24.38	-33.33	100	216
Creditworthiness of consumers	16.94	22.44	-25	100	216
Risk on the collateral demanded	7.65	16.97	-33.33	80	216
Loans terms and conditions:					
Margin on average for Business Loans	5.80	44.40	-100	100	216
Margin on riskier Business Loans	38.73	34.61	-50	100	216
Margin on average for Mortgage Loans	-9..236	35.27	-100	100	216
Margin on riskier for Mortgage Loans	13.43	25.48	-33.33	100	216
Margin on average for Consumer Credit Loans	-3.97	26.95	-66.67	80	216
Margin on riskier for Consumer Credit Loans	13.54	23.13	-33.33	90	216
Non-interest rate charges	8.55	21.17	-40	100	216
Size of the loan or credit line	11.06	20.32	-33.33	75	216
Collateral requirements	14.92	25.97	-46.5	100	216
Loan covenants	10.81	21.85	-33.33	83.33	216
Maturity	7.40	24.44	-50	80	216
Financial factors:					
EONIA	2.84	0.82	2.02	4.25	216
Taylor-rule Residuals	0.74	0.85	-0.99	2.46	216
10-year Government bond rates	3.99	0.50	2.20	4.97	216
Growth rate of GDP	2.36	1.92	-2.20	8.10	216
Inflation rate	2.62	0.94	0.80	5.60	216

Table A2: Summary Statistics: Bank Lending Survey Indicators and Financial Indicators

During the Financial Crisis (2008:Q4-2010:Q4)	Mean	Std.Dev.	Min	Max	Obs
Lending Standards:					
Business Loans	26.06	33.16	-14.29	100	81
Mortgage Loans	22.14	30.03	-26.4	100	81
Consumer Credit Loans	21.37	25.78	-17	100	81
Demand for Loans:					
Business Loans	-13.64	33.23	-86	50	81
Mortgage Loans	-6.37	48.02	-100	83.5	81
Consumer Credit Loans	-19.62	31.45	-100	50	81
Lending Standards Due to Balance Sheet Factors:					
Bank Capital Position	17.26	23.51	-25	80	81
Bank Liquidity Position	4.09	24.68	-40	80	81
Bank Market Financing	13.01	26.65	-40	100	81
All Balance Sheet Factors for Mortgage Loans	12.96	24.92	-60	100	81
All Balance Sheet Factors for Consumer Credit Loans	13.32	22.23	-25	100	81
Financial factors:					
EONIA	0.86	0.87	0.34	3.15	81
Taylor-rule Residuals	-0.16	1.21	-2.37	2.14	81
10-year Government bond rates	4.14	1.47	2.42	11.03	75
Growth rate of GDP	-1.37	3.66	-9.60	6.30	81
Inflation rate	1.31	1.41	-1.50	5.60	81

Table A3: Summary Statistics: Bank Lending Survey Indicators and Financial Indicators

After the Financial Crisis (2011:Q1-2014:Q4)	Mean	Std.Dev.	Min	Max	Obs
Lending Standards:					
Business Loans	8.46	24.73	-50	100	144
Mortgage Loans	12.78	25.12	-50	100	144
Consumer Credit Loans	7.80	21.29	-27.5	100	144
Demand for Loans:					
Business Loans	-12.90	29.08	-80	75	144
Mortgage Loans	-14.48	44.70	-100	100	144
Consumer Credit Loans	-14.76	32.85	-100	75	144
Lending Standards Due to Balance Sheet Factors:					
Bank Capital Position	8.52	20.18	-25	80	144
Bank Liquidity Position	0.39	25.01	-75	80	144
Bank Market Financing	6.55	21.28	-25	100	144
All Balance Sheet Factors for Mortgage Loans	10.18	22.41	-33.33	100	144
All Balance Sheet Factors for Consumer Credit Loans	7.22	19.83	-27.5	100	144
Perception of Risk:					
Expectations regarding general economic activity	15.94	28.89	-40	100	144
Industry or firm-specific outlook	18.13	28.88	-50	100	144
Risk on the collateral demanded	10.39	19.06	-25	80	144
Expectations regarding general economic activity	13.87	27.06	-40	100	144
Housing market prospects	14.68	24.91	-25	100	144
Expectations regarding general economic activity	10.45	25.53	-40	100	144
Creditworthiness of consumers	13.95	27.47	-20	100	144
Risk on the collateral demanded	7.79	20.56	-12.5	100	144
Loans terms and conditions:					
Margin on average for Business Loans	2.94	39.41	-80	100	144
Margin on riskier Business Loans	25.53	29.72	-25	100	144
Margin on average for Mortgage Loans	4.07	31.51	-66.67	100	144
Margin on riskier for Mortgage Loans	18.26	26.28	-28.57	100	144
Margin on average for Consumer Credit Loans	2.89	22.36	-50	100	144
Margin on riskier for Consumer Credit Loans	10.49	22.01	-25	100	144
Non-interest rate charges	4.94	20.37	-60	100	144
Size of the loan or credit line	6.91	25.37	-80	100	144
Collateral requirements	10.87	25.46	-25	100	144
Loan covenants	6.74	22.59	-50	100	144
Maturity	10.82	26.47	-60	100	144
Financial factors:					
EONIA	0.32	0.34	-0.02	1.04	144
Taylor-rule Residuals	-1.02	0.52	-2.20	0.76	144
10-year Government bond rates	4.63	4.49	0.70	25.40	144
Growth rate of GDP	-0.37	2.66	-10.40	6.00	144

Appendix B

Table B1:Detailed illustrations of questions posed in the BLS survey and variables used in this analysis

Bank Lending Survey Questions[39]		Definition	Measures
Bank's credit standards		Total lending Standards for:	Net percentage of banks reporting a tightening over the previous quarter.
Over the past three months, how have your bank's credit standards as applied to the approval of loans or credit lines to …. changed?	Loans or credit lines to enterprises (Qs1)	Business Loans	
	Loans for house purchase (Qs8)	Mortgage Loans	
	Consumer credit and other lending (Qs8)	Consumer Loans	
Factors affecting bank credit standards:	Loans or credit lines to enterprises (Qs2)	Total lending Standards for:	Net percentage of banks reporting a tightening over the previous quarter.
Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of loans or credit lines to …….?	A.1) Bank's cost of capital	Business Loans	
	A.2) Access to market financing		
	A.3) Bank's liquidity position		
A) Cost of funds and balance sheet constraints	All factors for house purchase (Qs9)	Mortgage Loans	
	All factor for consumer credit and other lending (Qs11)	Consumer Loans	
C) Perception of risk	Expectations regarding general economic activity (Qs2)	Business Loans	
	Industry or firm-specific outlook (Qs2)	Business Loans	
	Risk on the collateral demanded (Qs2)	Business Loans	
	Expectations regarding general economic activity (Qs9)	Mortgage Loans	
	Housing market prospects (Qs9)	Mortgage Loans	
	Expectations regarding general economic activity(Qs11)	Consumer Loans	
	Creditworthiness of consumers (Qs11)	Consumer Loans	
	Risk on the collateral demanded (Qs11)	Consumer Loans	
Loans terms and conditions:	A) Qs(3), Qs(10) and Qs(12)	Business Loans	Net percentage of banks reporting a tightening over the previous quarter.
Over the past three months, how have your bank's conditions and terms for approving loans or credit lines to …. changed?	Your bank's margin on average loans	Mortgage Loans	
	Your bank's margin on riskier loans	Consumer Loans	
A) Price	B) Qs(3)	Business Loans	
B) Other conditions and terms		Non-interest rate charges	
		Size of the loan or credit line	
		Collateral requirements	
		Loan covenants	

		Maturity	
	B) Qs(10)	Mortgage Loans Collateral requirements "*Loan-to-value"* ratio Maturity Non-interest rate charges	
	B) Qs(12)	Consumer Loans Collateral requirements Maturity Non-interest rate charges	
Demand for Loans Over the past three months, how has the demand for loans or credit lines to …..changed at your bank, apart from normal seasonal fluctuations?	Demand for loans to enterprises (Qs4) Demand for loans for house purchase (Qs13) Demand for loans for consumer credit (Qs13)	Demand Business Loans Mortgage Loans Consumer Loans	Net percentage of banks reporting an increase in loan demand over the previous quarter**.**

Table B2: Data Sources

Macroeconomic variables	**Definition**	**Data Source**	**Sample**
EONIA	Quarterly average of the EONIA overnight interest rate	Eurostat	2002:Q4-2014:Q4
Taylor-rule Residuals	Residuals of a panel regression of EONIA on growth rate of GDP and inflation rates	Eurostat, ECB	2002:Q4-2014:Q4
10-year government bond yield	Quarterly average of daily government bond yields	Datastream	2002:Q4-2014:Q4
Growth rate of GDP	Quarterly growth rate of real GDP	Eurostat	2002:Q4-2014:Q4
Inflation rate	Quarterly rate of inflation	OECD	2002:Q4-2014:Q4

[39] For a complete summary of the survey carried out by the ECB, refer to Appendix C.

Appendix C

BANK LENDING SURVEY FOR THE EURO AREA

THE QUESTIONNAIRE

I. Loans or credit lines to enterprises

1. Over the past three months, how have your bank's credit standards as applied to the approval of loans or credit lines to enterprises changed?

	Overall	Loans to small and medium-sized enterprises	Loans to large enterprises	Short-term loans	Long-term loans
Tightened considerably					
Tightened somewhat					
Remained basically unchanged					
Eased somewhat					
Eased considerably					

2. Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of loans or credit lines to enterprises (as described in question 1)? Please rate the contribution of the following factors to the tightening or easing of credit standards using the following scale:

– – = contributed considerably to tightening of credit standards

– = contributed somewhat to tightening of credit standards

○ = contributed to basically unchanged credit standards

+ = contributed somewhat to easing of credit standards

+ + = contributed considerably to easing of credit standards

NA = not applicable

	Overall						Loans to small and medium-sized enterprises						Loans to large enterprises					
	--	-	0	+	++	NA	--	-	0	+	++	NA	--	-	0	+	++	NA
A) Cost of funds and balance sheet constraints																		
□ Costs related to your bank's capital position (1)																		
□ Your bank's ability to access market financing (e.g. money or bond market financing, incl. true-sale securitisation (2))																		
□ Your bank's liquidity position																		
B) Pressure from competition																		
□ Competition from other banks																		
□ Competition from non-banks																		
□ Competition from market financing																		
C) Perception of risk																		
□ Expectations regarding general economic activity																		
□ Industry or firm-specific outlook																		
□ Risk on the collateral demanded																		
D) Other factors, please specify																		

(1) Can involve the use of credit derivatives, with the loans remaining on the bank's balance sheet.

(2) Involves the sale of loans from the bank's balance sheet, i.e. off-balance sheet funding.

3. Over the past three months, how have your bank's conditions and terms for approving loans or credit lines to enterprises changed? Please rate each factor using the following scale:

– – = tightened considerably

– = tightened somewhat

○ = remained basically unchanged

+ = eased somewhat

+ + = eased considerably

NA = not applicable

	Overall						Loans to small and medium-sized enterprises						Loans to large enterprises					
	--	-	0	+	++	NA	--	-	0	+	++	NA	--	-	0	+	++	NA
A) Price □ Your bank's margin on average loans (wider margin = tightened, narrower margin = eased) □ Your bank's margin on riskier loans B) Other conditions and terms □ Non-interest rate charges □ Size of the loan or credit line □ Collateral requirements □ Loan covenants □ Maturity																		
C) Other factors, please specify																		

4. Over the past three months, how has the demand for loans or credit lines to enterprises changed at your bank, apart from normal seasonal fluctuations?

	Overall	Loans to small and medium-sized enterprises	Loans to large enterprises	Short-term loans	Long-term loans
Decreased considerably					
Decreased somewhat					
Remained basically unchanged					
Increased somewhat					
Increased considerably					

5. Over the past three months, how have the following factors affected the demand for loans or credit lines to enterprises (as described in question 4 in the column headed "Overall")? Please rate each possible factor using the following scale:

– – = contributed considerably to lower demand

– =contributed somewhat to lower demand

○ =contributed to basically unchanged demand

+ =contributed somewhat to higher demand

+ + =contributed considerably to higher demand

NA = not applicable

	– –	–	○	+	+ +	NA
A) Financing needs □ Fixed investment □ Inventories and working capital □ Mergers/acquisitions and corporate restructuring □ Debt restructuring B) Use of alternative finance □ Internal financing □ Loans from other banks □ Loans from non-banks □ Issuance of debt securities □ Issuance of equity						
C) Other factors, please specify						

6. Please indicate how you expect your bank's credit standards as applied to the approval of loans or credit lines to enterprises to change over the next three months.

	Overall	Loans to small and mediumsized enterprises	Loans to large enterprises	Short-term loans	Long-term loans
Tighten considerably					
Tighten somewhat					
Remain basically unchanged					
Ease somewhat					
Ease considerably					

7. Please indicate how you expect demand for loans or credit lines to enterprises to change at your bank over the next three months (apart from normal seasonal fluctuations)

	Overall	Loans to small and medium-sized enterprises	Loans to large enterprises	Shortterm loans	Long-term loans
Decrease considerably					
Decrease somewhat					
Remain basically unchanged					
Increase somewhat					
Increase considerably					

II. Loans to households

8. Over the past three months, how have your bank's credit standards as applied to the approval of loans to households changed?

	Loans for house purchase	Consumer credit and other lending
Tightened considerably		
Tightened somewhat		
Remained basically unchanged		
Eased somewhat		
Eased considerably		

9. Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of loans to households for house purchase (as described in question 8)? Please rate the contribution of the following factors to the tightening or easing of credit standards using the following scale:

– – = contributed considerably to tightening of credit standards

– = contributed somewhat to tightening of credit standards

○ = contributed to basically unchanged credit standards

+ = contributed somewhat to easing of credit standards

+ + = contributed considerably to easing of credit standards

NA = not applicable

	– –	–	○	+	+ +	NA
A) Cost of funds and balance sheet constraints B) Pressure from competition □ Competition from other banks □ Competition from non-banks C) Perception of risk □ Expectations regarding general economic activity □ Housing market prospects						
D) Other factors, please specify						

10. Over the past three months, how have your bank's conditions and terms for approving loans to households for house purchase changed? Please rate each factor using the following scale:

– – = tightened considerably

– = tightened somewhat

○ = remained basically unchanged

+ = eased somewhat

+ + = eased considerably

NA = not applicable

	– –	–	○	+	+ +	NA
A) Price □ Your bank's margin on average loans (wider margin = tightened, narrower margin = eased) □ Your bank's margin on riskier loans B) Other conditions and terms □ Collateral requirements □ "Loan-to-value" ratio □ Maturity □ Non-interest rate charges						
C) Other factors, please specify						

11. Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of consumer credit and other lending to households (as described in question 8)? Please rate the contribution of the following factors to the tightening or easing of credit standards using the following scale:

– – = contributed considerably to tightening of credit standards

– = contributed somewhat to tightening of credit standards

○ = contributed to basically unchanged credit standards

+ = contributed somewhat to easing of credit standards

+ + = contributed considerably to easing of credit standards

NA = not applicable

	– –	–	○	+	+ +	NA
A) Cost of funds and balance sheet constraints B) Pressure from competition □ Competition from other banks □ Competition from non-banks C) Perception of risk □ Expectations regarding general economic activity □ Creditworthiness of consumers □ Risk on the collateral demanded						
D) Other factors, please specify						

12. Over the past three months, how have your bank's conditions and terms for approving consumer credit and other lending to households changed? Please rate each factor using the following scale: – – = tightened considerably

– = tightened somewhat

○ = remained basically unchanged

+ = eased somewhat

+ + = eased considerably

NA = not applicable

	– –	–	○	+	+ +	NA
A) Price □ Your bank's margin on average loans (wider margin = tightened, narrower margin = eased) □ Your bank's margin on riskier loans B) Other conditions and terms □ Collateral requirements □ Maturity □ Non-interest rate charges						
C) Other factors, please specify						

13. Over the past three months, how has the demand for loans to households changed at your bank, apart from normal seasonal fluctuations?

	Loans for house purchase	Consumer credit and other lending
Decreased considerably		
Decreased somewhat		
Remained basically unchanged		
Increased somewhat		
Increased considerably		

14. Over the past three months, how have the following factors affected the demand for loans to households for house purchase (as described in question 13)? Please rate each factor using the following scale:

– – = contributed considerably to lower demand

– = contributed somewhat to lower demand

○ =contributed to basically unchanged demand

+ = contributed somewhat to higher demand

+ + = contributed considerably to higher demand

NA = not applicable

	– –	–	○	+	+ +	NA
A) Financing needs □ Housing market prospects □ Consumer confidence □ Non-housing related consumption expenditure B) Use of alternative finance □ Household savings □ Loans from other banks □ Other sources of finance						
C) Other factors, please specify						

15. Over the past three months, how have the following factors affected the demand for consumer credit and other lending to households (as described in question 13)? Please rate each factor using the following scale:

– – = responsible for considerable decrease

– = responsible for decrease

○ = responsible for neither decrease nor increase

+ = responsible for increase

+ + = responsible for considerable increase

NA = not applicable

	– –	–	○	+	+ +	NA
A) Financing needs □ Spending on durable consumer goods, such as cars, furniture, etc. □ Consumer confidence □ Securities purchases B) Use of alternative finance □ Household savings □ Loans from other banks □ Other sources of finance						
C) Other factors, please specify						

16. Please indicate how you expect your bank's credit standards as applied to the approval of loans to households to change over the next three months.

	Loans for house purchase	Consumer credit and other lending
Tighten considerably		
Tighten somewhat		
Remain basically unchanged		
Ease somewhat		
Ease considerably		

17. Please indicate how you expect demand for loans to households to change over the next three months at your bank (apart from normal seasonal fluctuations).

	Loans for house purchase	Consumer credit and other lending
Decrease considerably		
Decrease somewhat		
Remain basically unchanged		
Increase somewhat		
Increase considerably		

III. Open-ended question

18. Over the past three months, have there been any other issues of importance for bank lending behaviour in the euro area or in your country which are not covered by this survey?

[IV. Additional ad-hoc questions on specific topics of interest]

Chapter 4: Finance constraints and the use of alternative sources in Europe

4.1 Introduction

Small and medium-sized enterprises (SMEs) have great significance in the euro area corporate sector. They comprise 99.8% of all the firms in the euro area, 60% of turnover and 70% of employment. Additionally, SMEs are more than only *"scaled-down"* types of large enterprises. It appears that the monetary policy transmission mechanism differs in the case of SMEs relative to large companies due to the SMEs' greater reliance on bank financing.

In the subsequent aftermath of the 2007-8 financial crisis, lending to SMEs became the number one priority to consider for governing authorities worldwide, given that they are commonly referred to as the backbone of the European Union (EU) economy; this is particularly the case within the context of cautious lending when banks are disinclined to increase lending activity and volume irrespective of the monetary policy stance.

In this economic background, several studies have concentrated on analysing the impact and determinants of bank lending constraints on firms from the beginning of the financial turmoil (de la Torre *et al*., 2010; Ferrando and Griesshaber, 2011; Freel *et al*., 2012; Popov and Udell, 2012; Kremp and Sevestre, 2013; Popov, 2013; Öztürk and Mrkaic, 2014; Casey and O'Toole 2014; Beck *et al*., 2014; Andrieu *et al*., 2015; Lawless *et al*., 2015a; Ferrando *et al*., 2015; Ferrando and Mulier, 2015; Thomadakis, 2015; Cole and Sokolyk, 2016; Cowling *et al*., 2016; Mac an Bhaid *et al*., 2016; among others).

The aim of this chapter is to examine whether bank lending constrained SMEs demonstrate relatively more usage or requests for alternative financing; additionally, we

offer a comprehensive evaluation by revealing the impact and determinants involved in a broad range of financing constraints and further outlining the important concept of discouraged borrowers, which is originally described by Kon and Storey (2003) as "*a good firm, requiring finance that chooses not to apply to the bank because it feels its application will be rejected*". This study concentrates on 11 countries in the euro area: Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, the Netherlands and Portugal, hereafter EU-11, and uses data from the European Central Bank (ECB)/European Commission (EC) Survey on the Access to Finance of Enterprises (SAFE) for twelve waves spanning the time frame 2009 to 2014.

In this chapter the following points will be looked at in detailed: (1) first it investigates whether bank lending constraints SMEs demonstrate relatively more usage or requests for alternative financing such as grants or subsidised bank loans, trade credit, informal lending, leasing, hire purchase or factoring, market financing comprised of equity, issued debt securities or subordinated loans, and internal funds; (2) furthermore, it offers a comprehensive evaluation through revealing the impact and determinants involved in the different financing constraints such as credit lines, bank loans, trade credit and other lending[40] on EU-11 firms; (3) thirdly, it attempts to add to the current research through analysing the concept of discouraged borrowers by evaluating the key determinants of discouragement using firm-specific traits as well as banking and macroeconomic indicators; (4) finally, the sampled EU-11 nations are grouped with respect to the severity of the impact of the financial crisis into two panels of A and B. Panel A comprises Greece, Spain, Italy, Portugal and Ireland whereas Panel B is composed of Austria, Belgium, France, Germany, Luxembourg, the Netherlands.

[40] It can be supplied from the subsequently outlined resources: loans from a related company, shareholders or family and friends, leasing, factoring, grants, subordinated debt instruments, participating loans, peer to-peer lending, crowdfunding, and issuance of equity and debt securities.

The objective here is to ascertain the existence of significant variation between the stressed vs. non-stressed countries of the EU-11 relative to the findings derived from the main findings for EU-11 and the subsequent deduction as a result.

Measures of credit constraints differentiate between five categories of constrained firms according to the following forms: a) credit constrained firms b) credit rationed firms c) credit rejected firms d) self-rationed firms and lastly e) discouraged firms (see Table 3 for a detailed description). Moreover, this research attempts to determine if these outcomes vary by factoring in the following firm characteristics: age, ownership status and size, along with quality, and risk and creditworthiness factors. The methodology used to tackle endogeneity here is analogous to that employed in Casey and O'Toole (2014) which recommends that the first lagged of bank lending constraints are used, whereas firm-level heterogeneity regulated via a panel prohibit specification with random effects.

Within the period of this present evaluation no effect between the different credit-constrained measures regarding the utilisation of trade credit was identified; this result is robustly demonstrated in stressed and non-stressed countries of the Eurozone. It is clear that small- and medium- sized firms are more likely to use trade credit. Yet, we do not find any statistically significant results supporting the idea that older firms tend to utilise trade credit more than younger firms.

An unexpected inverse significant relationship between constrained measures and the demand for grant financing has been found. Firms experiencing rejected credit applications are 6% less likely to utilise grant financing. Stressed Eurozone countries are less likely to use grant financing when compared with non-stressed countries. Younger firms are 8% more likely to use this source of financing; however, this observation only holds true for non-stressed countries.

According to the evidence credit-constrained, rationed and discouraged firms demonstrate a greater tendency to utilise informal lending. Moreover, younger firms are 10% more likely to use informal lending while older firms are not as likely to do so. Medium-sized firms show a higher tendency to utilise informal lending as a further component of their financing alternatives, relative to small-sized firms.

Moreover, firms who experience rejected credit applications are 2% less likely to use market financing; this statistic is solely applicable to stressed countries of the Eurozone. Yet, no corroborating evidence for additional constrained measures is detected.

Focusing on utilisation of internal funds[41] and leasing, hire purchase and factoring, the results fail to establish a relationship between credit-constrained measures and the utilisation of the aforementioned financing types. From the data analysis it can be determined that both small- and medium-sized firms are more inclined to utilise leasing, hire purchase and factoring by approximately 26% and 40%, respectively. Older firms also show a higher tendency to utilise this kind of financing. Crucially no relationship between firm's ownership types and the utilisation of internal funds is detected.

It can be determined that micro and younger firms are comparatively more prone to having applications for bank loans and credit line rejected; this result corroborates the majority of prior empirical research on SMEs' access to finance (Beck *et al.*, 2006; Psillaki and Daskalakis, 2009; Brown *et al*., 2011; Holton *et al*., 2014; among others). Similar corroborating evidence regarding firm's size and trade credit rejection is detected; yet no conclusive finding is established regarding the association between firm's age and our constrained indicators for trade credit.

[41] There is limited evidence to support the utilisation of internal funds by credit-constrained firm in non-stressed countries of the Eurozone. As a result, the primary discussion remains intact.

Furthermore, micro and small firms operating in industry sector are more likely to be rejected for other financing; however, this outcome is only valid when reflecting the main sample and the sub-sample specific to the periphery countries of the Eurozone.

In line with our prior expectation, based on the results smaller, younger firms are more likely to get discouraged for bank loans. When examining stressed countries of the EU-11, there is substantial evidence to assert that micro firms are more likely to be discouraged; however, no corroborating data regarding the impact of firms' ages on the level of discouragement is found, which is in contrast to the pattern seen in the whole sample. Both micro and small firms in non-stressed countries experience somewhat lower discouragement rates compared with stressed countries.

The remainder of this chapter is organised as follows. Section 4.2 presents a review of the empirical literature. Section 4.3 describes the data and the methodology. Section 4.4 discusses the empirical results, while section 4.5 concludes with a brief synopsis of the main results.

4.2 Literature review

With the purpose of constructing a comprehensive understanding of the concepts addressed in this chapter, a concise analysis of the fundamentals involved in the key terms of this subject is necessary.[42] Considering that this study is most heavily related to current research concerning the connection between bank lending constraints and alternative finance utilisation, it provides a critical evaluation of the empirical studies that analysed this connection between bank lending and trade credit, grants or subsidised bank loans,

[42] Table A1 provides a thorough review of recent studies that adopted survey data in the Eurozone (see Appendix A).

informal lending, market financing comprised of equity, issued debt securities or subordinated loans, leasing, hire purchase or factoring and internal funds. Lastly, we evaluate the concept of '*discouraged borrowers'* with reference to the US and the EU countries.

4.2.1 Trade credit

Several studies serve to highlight the impact of a firm's specific risk and quality on the utilisation of trade credit (Petersen and Rajan, 1995 and 1997; Ng *et al*., 1999; Klapper *et al*., 2012; Aktas *et al*., 2012; among others).

Petersen and Rajan (1997) concentrate on small firms with potentially limited access to capital markets. The authors conclude that firms utilise additional trade credit during period of unavailable credit offered by the financial institution and propose that suppliers lend to constrained firms since they have the upper hand in relative terms when acquiring information concerning buyers, may liquidate assets efficiently and possess an implicit equity stake in the firms.

A seminal paper by Ng *et al*. (1999) offers a comprehensive evaluation of current industry trade credit practice. The study analyses determinants of differences in interfirm credit terms and credit policies throughout industries, offering results which mainly corroborate theories that describe credit terms as legally binding resolutions concerning information issues relating to merchandise quality and buyer creditworthiness. Furthermore, the results fail to offer proof for liquidity of the seller as a chief motivating factor involved in the process of deciding whether to extend credit.

Accordingly, Klapper *et al*. (2012) utilise a new data set in nearly 30,000 trade credit contracts in the US and Europe with the purpose of characterising the extensive traits of the parties involved in contracts as well as the important terms commonly associated with

such contracts. The results show that the largest and most creditworthy borrowers are awarded contracts with maturities of the longest durations (calculated using net days) by smaller suppliers; moreover, discounts for early payment show a tendency to be extended to riskier borrowers.

Utilising US data, Aktas *et al*. (2012) develop a model which forecasts a direct relationship between utilisation of trade credit and the quality of the firm's investments. By employing numerous proxies for firm's investment quality calculated using Z-score, return on assets and long-run abnormal returns, the researchers demonstrated that this forecast is well supported by a significant sample of US firms from 1992 to 2007.

In this study, we examine the demand for trade credit by constrained firms both during and after the financial crisis. Empirical literature addressing these topics is well documented (Biais and Gollier, 1997; Burkart and Ellingsen, 2004; Fabbri and Menichini, 2010; among others). Biais and Gollier (1997) suggest an indicative model that the availability of trade credit indicates the creditworthiness of the customer, considering that exclusive information is stored by suppliers regarding customers in comparison with banks, which leads to reduced credit rationing. Comparably, Burkart and Ellingsen (2004) posit that the supplier possesses an informational edge over the banks; therefore, suppliers could lend less prudently, yet this edge is solely applicable to input transactions. Fabbri and Menichini (2010) foil these earlier studies since collateralised bank and trade credit are factored into the model. The researchers maintain that suppliers are more capable of obtaining value as a result of the liquidation of assets in default and possess an information advantage through their provision of finance; significantly, the incentive to accept trade credit differs between economic branches, as stated in their study. Whether firms request trade credit to take advantage of the suppliers' liquidation edge or to ease credit constraints is contingent on the particular traits of the inputs bought on credit. The

previously discussed theories are supported by studies in the empirical literature (Ng *et al.,* 1999; Petersen and Rajan, 1997).

Mateut (2005) offers a comprehensive survey of the influence of trade credit in the Monetary Transmission Mechanism (MTM). A study by Huang *et al*. (2011) investigates the substitution connection between trade credit and bank credit, by utilising a balanced panel data set derived via listed Chinese companies. The study highlights systematic proof of the substitution effect as well as its counter-cyclic pattern. Additionally, they characterise the substitution as demonstrating counter-cyclical behaviour concerning the concurrent macroeconomic proxy, specifically GDP.

Concentrating on the euro area countries, Ferrando and Mulier (2013) demonstrate that firms utilise trade credit channel in order to maintain control over growth. Nations in which the trade credit channel shows greater presence report reduced marginal effect, yet the overall effect remains greater. Moreover, firms with greater susceptibility to financial market imperfections show greater dependence on the trade credit channel in order to control growth.

Love *et al*. (2007) examine the impact of financial crises on trade credit in a number of emerging East Asian nations. The researchers measure growth of trade credit during the height of the financial crises, then succeeded by a breakdown of origin of the financing immediately following crisis events. Particularly noteworthy was the revelation that prior to a crisis, firms possessing a large percentage of short-term debt are important suppliers of trade credit; however, post-crisis, such firms distinctly reduce the credit offered to borrowers while relying more on credit from suppliers. The notion that firms with more liquidity also extend higher credit to borrowers and receive lower credit via suppliers is supported in the available literature.

4.2.2 Grants or subsidies bank loans

Many studies analyse the effectiveness of the policy measures aimed at SME credit coined as credit guarantee schemes (Green, 2003; Honohan, 2010; Beck *et al.,* 2008 and 2010; Cowling, 2010; among others).

Beck *et al.* (2008) theorise that banks perceive "*partial credit guarantee schemes*" as showing the highest prevalence and efficiency out of all of the government aid schemes specific to SME lending. Additionally, Beck *et al.* (2010) examine various organisational characteristics pertaining to credit guarantee schemes as well as the inherent differences throughout 46 developed and developing nations. Their research demonstrates that a government is a significant factor concerning funding and management, yet this influence is reduced in risk assessment and recovery.

A study by Cowling (2010) stresses the significance of credit rationing as a crucial component of the UK small business sector. The investigation focuses on the UK Small Firms Loan Guarantee Scheme (SFLGS) from 1993 to 1998, revealing data that suggest that this scheme has achieved its main goals. Honohan (2010) notes that credit guarantees exist in accordance with the nature of the market; however, in situations in which these guarantees are unavailable when required, expertly constructed government-sponsored schemes could serve as a necessary component of a "*welfare-improving policy of government intervention*" with the purpose of refining financial intermediation function regarding SMEs.

4.2.3 Other loans (e.g. from related company or shareholders)

There is a need for additional development of research directed at investigating the connection between informal lending and bank lending, which mainly concentrates on

emerging economies (Guirkinger, 2008; Giné 2011; Xiaoa and North 2012; among others).

The scope of this present research comprises informal origins of finance obtained straight from related company and shareholders loans. With reference to the data set, it is worthwhile to mention here that it is impossible to divide other loans into distinct, dual groups of loans from related companies' and shareholders' loans.

Chavies *et al.* (2011) use the World Bank Enterprise Survey (WBES) in their investigation of the function of various financing sources with respect to new and young firms. The authors demonstrate that younger firms don't rely as much on bank financing compared with informal financing. Their research documents an obvious substitution effect: there is a positive correlation between firm maturity and tendency to switch from informal finance to bank finance, whereas the overall percentage of firms employing external finance stays practically constant. Additionally, the authors posit that information asymmetry exerts a significant function in reducing the capability of a young firm to be granted bank-sourced capital.

Allen *et al.* (2012) characterise family and friends as sources of very crucial, inexpensive funding to Indian SME's during the start-up and growth stages. Comparable supporting results are documented concerning the non-listed firms in China (see Allen *et al.*, 2005). Ayyagari *et al.* (2010) complement earlier research while additionally implying that although comparably few firms use bank loans in China, bank financing is linked to greater growth rates unlike informal financing. Casey and O'Toole (2014) reason that smaller firms could signal more risk, as well as unpredictable development patterns and bank loans, accordingly, present a greater challenge to observe; this shows the risks associated with this specific class of firms as well as the inaccessibility of traditional banking in broader terms.

4.2.4 Market financing

A study by Kashyap *et al*. (1993) demonstrated that although bank loans decrease during monetary contraction periods, commercial paper volume rises. These findings imply that instead of an inward change in load demand, an inward shift in loan supply occurs. The conclusions made in Kashyap *et al*. (1993) may be explained by the fact that larger firms are demonstrated to issue the majority of commercial paper. Denis and Mihov (2003) evaluate determinants from public debt, bank debt, and non-bank private debt, demonstrating that the main influence in determining the origin of debt is the credit quality of the issuer. Businesses possessing high credit quality clearly favour public debt, whereas firms with middle-ranking credit tend to borrow from banks, and entities possessing the lowest credit ratings borrow from non-bank private lenders. Furthermore, Leary (2009) determines that bank-dependent firms move to equity in backgrounds of low bank debt. Rauh and Sufi (2010) demonstrate that in comparison to greater creditquality firms, lesser credit-quality firms show a greater tendency to possess several tiers in their capital structure including two components: secured bank debt with restrictive covenants and subordinated non-bank debt with relaxed covenants.

4.2.5 Leasing/factoring

Beck and Demirguc-Kunt (2006) show that particular financing (e.g. leasing and factoring) may offer value by allowing more access to finance, despite the presence of poorly-developed institutions. A banking system with greater competition and a credit information sharing system can also offer value in their implementation.

Factoring includes buying accounts receivable by a financier, recognised as the factor defined by (Beck and Demirguc-Kunt, 2006); therefore, factoring is not considered to be a lending method, elevating its appeal to nations with inadequate legal framework.

Additionally, factoring is independent of information regarding the ‘‘*borrower”*, yet instead dependent on the obligor, qualifying it as an appealing financing instrument employed by comparably opaque SMEs (Beck and Demirguc-Kunt, 2006). Furthermore, a study by Klapper (2006) characterises factoring as helping a supplier with more associated risk to hand over its credit risk to buyer with greater quality. The author reports that factoring is greater in nations with more economic progress and growth, as well as established credit information bureaus.

In contrast to bank credit, leasing immediately supplies the asset rather than financial means required to purchase it, reducing the likelihood of changes to the direction of funds for uses other than what were conceived. Leasing contracts are associated with less administrative input as well as less restrictive credit standards, facilitating shorter waiting times compared with bank loans (Beck and Cull, 2014). In a similar vein Berger and Udel (2006) report that leasing is associated with buying fixed assets as ‘‘*lender’’* called a lessor. The authors characterise leasing as a rather prevalent technique of financing equipment, motor vehicles, and real estate practiced by financial institutions in numerous nations. The lessor buys the fixed assets while at the same time agreeing to a rental contract between the lessor and the lessee outlining a payment timetable. Leasing may be utilised in order to offer financing to opaque firms since an underwriting judgement is mainly founded on the value of a leased asset. Furthermore, it is reported that leasing may diminish an adverse selection issue in the second-hand equipment market as a result of promoting greater quality of goods sold *“off-lease”* (Berger and Udel, 2006). Tax benefits are also frequently involved and leasing facilitates recovery in the instant that precise legal system is present (Beck, 2013).

Moreover, Beck and Cull (2014) posit that cutting-edge companies and businessmen ask for traditional bank lending and commercial credit as a result of absent credit history and

insufficient guarantees may discover a novel financing option regarding the leasing market.

4.2.6 Internal funds

Myers and Majluf (1984) show that financing alternatives for mature companies may be comprehended using the pecking order theory. On a related note, Chavies *et al*., (2011) suggest that these firms tend to possess additional internal funds (retained earnings) as a result of increased profitability and decreased development prospects; thus the firms could preferably utilise internal funds over bank loans. Comparable empirical observations are detailed in Vanacker and Mangigart (2010) who report that successful companies opt for financial investments including retained earnings, irrespective of the presence of unused debt potential. Furthermore, Czarnitzki and Hottenrott (2011) suggest that particularly young firms lacking a track record and as unpredictable prospects are ranked quite poorly, bank loans are generally costly for such firms. Given that new businesses also can't depend on retained earnings as a consequence of cash inflow sourced from previous product sales, financing restrictions can also be more limiting for these companies (Gompers and Lerner, 1999; Ritter, 1991). Vanacker and Mangigart (2010) reason that if internal funds are not enough to cover financing requirements, managers' resort to more expensive external funds. As a result, mature firms may be more capable of getting loans with improved financial terms than their younger competitors (Bulan and Yan, 2009; Carpenter and Rondi, 2000). Moreover, well reputed-firms with extensive credit histories have less problems with adverse selection issues between debtors and creditors (Chavies *et al.*, 2011).

4.2.7 Discouraged borrowers

An integral issue that is currently less examined that has garnered the attention of researchers and policy makers alike, is the notion of *'discouraged borrowers'* which was described in Kon and Storey (2003); this term is defined as "*a good firm, requiring finance, that chooses not to apply to the bank because it feels its application will be rejected*". The Stiglitz and Weiss empirical model (1981) excludes these borrowers on account of the fact that they do not submit bank applications. Kon and Storey (2003) suggest that, in the background of a variety of suppositions, the degree of discouragement in an economy is contingent on the screening error of the banks, the scope of application costs and the degree to which banks interest rates vary relative to those charged by the money lenders. According to Kon and Storey (2003), one of the most important contributing factors to discouragement is the quality of borrowers which cannot be observed. In an ideal scenario, creditors would prefer to attract good borrowers and discourage bad borrowers; yet the borrower's quality cannot be precisely quantified due to information asymmetries. Imperfect information is fundamental to the idea of discouraged borrowers and obtaining credible data from informationally non-transparent small business borrowers is an issue that influences lending institutions (Han *et al*., 2009). Empirical studies utilise credit lines as a proxy to estimate information transparency in businesses since creditworthiness is evaluated in the external financing market (Petersen and Rajan, 2002; Cole, 2013; Han *et al*., 2009).

Levenson and Willard (2000) suggest that small businesses show a greater tendency to disclose discouragement compared with rejection, similar to the findings derived from Freel *et al*. (2012).[43] Kon and Storey (2003) estimate that levels of discouragement are

[43] Freel *et al*. (2012) suggest that family firms are more cautious and less inclined to resort to bank loans; additionally firms lacking well-developed banking relationships show a higher tendency to document

greater in developing countries. Furthermore, the authors classify "*unobservable quality of borrowers*" as a considerably significant determinant of discouragement. When examining the US Han *et al.* (2009) utilise data from the 1998 US Survey of Small Business Finances (SSBF) from 1998. The research concludes that riskier borrowers show a greater likelihood of discouragement; this tendency to be discouraged is positively correlated with the duration of the relevant financial relationship, potentially classifying discouragement as an effective self-rationing mechanism.

These findings are in keeping with Cowling *et al.* (2016), a study that evaluates a sample of 3089 SMEs in the UK following the onset of GFC. The study notes that smaller and younger firms show higher tendencies to be discouraged. Furthermore, discouraged borrowers seem to be riskier firms which apply for bank loans; however, they are also aware of their riskiness; accordingly, their hesitation to take on loans and application costs are well-founded.

Moreover, a study by Mac an Bhaid *et al.* (2016) stresses that the financial strain, which arises as a result of decreasing turnover, reducing capital and a higher debt to assets ratio eventually leads to a rise in discouragement. Comparatively, Cole and Sokolyk (2016) argue that discouraged, smaller firms have relatively worse credit histories and show a higher tendency to be situated in urban regions. Discouraged firms utilise less financial support (both bank and non-bank). Furthermore, firms suffering from worsening financial conditions show a higher tendency to be discouraged for loan applications (Mac an Bhaid *et al.*, 2016)

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discouragement. They argue that various industrial sectors should reflect varied asset and capital frameworks more often, and also experience varied competitive backgrounds. Accordingly, it can be predicted that specific sector would influence funding goals and behaviour.

The inclusion of legal, judicial and bankruptcy frameworks is considered crucial when evaluating the efficiency of the external financing market (Beck *et al*., 2011). The authors determine that small companies are especially adversely impacted by poor legal and monetary mechanism. Additionally, increased sovereign bonds yields cause more rejection of bank loans as outlined in Holton *et al*. (2014). Accordingly, one could predict a higher level of borrowers' discouragement as a result of higher government bonds yields particularly in the Eurozone stressed countries.

Han *et al.* (2009) rationalise that discouragement is influenced by the level of concentration in domestic banking markets, which is partially caused attributed to screening error of the banks as shown by Kon and Storey (2003). If the bank industry is concentrated this should result in reduced frequency of errors because less banks are likely to have centralized, comprehensive and constant data regarding possible borrowers in an economy. Following Kon and Storey (2003), Han *et al.* (2009), Thomadakis, 2015, and Mac an Bhaid *et al.* (2016), the performance of the banking industry environment should also be contemplated; as a result, the market power is determined via Lerner index which is also includes the advantage inherent in a separate, dynamic gauge of market power (Brämer et al., 2013).[44]

4.3 Data and model specification

4.3.1 The data

A study conducted by the ECB and the EC demonstrated that comparable, suitable and constant data is not available for SMEs in the EU. In order to compensate for this, the ECB and the EC agreed to cooperate in producing a survey examining the access to

[44] Only banks designated as commercial, cooperative and savings are included in our evaluation. Central banks and investment banks are omitted since they do not directly participate in lending to SMEs (see Appendix D for further information).

finance of enterprises in the EU. This present study utilises the SAFE data gathered by the ECB on a half-yearly basis in addition to data gathered by the EC every two years in order to increase the scope of the sample.

As of 2009, the SAFE is intended to encapsulate well-timed, exact data regarding the financing of firms in addition to their employment of and interaction with financing technologies. The primary objective of the survey is to influence and guide the ECB monetary policy selections, while guaranteeing constructive observation of transmission mechanisms throughout the euro area.[45]

The survey includes micro, small, medium-sized and large firms and offers empirical data concerning the financing conditions that SMEs are confronted with, in contrast to the large firms within the previous half-year. This study concentrates on 11 countries in the euro area with a heterogeneous depiction of SMEs and utilises the biannual SAFE data for twelve waves spanning the time frame 2009 to 2014.[46]

Of particular note is that each firm was surveyed again when practicable, which facilitated the provision of a panel dataset in firms from the different waves of the SAFE survey of the euro area SMEs.

As evidenced from Table 1, Germany, Spain, France and Italy combine to make up the majority of the total sample at nearly two thirds of the total euro area SMEs. Accordingly, the smaller euro area countries and their SMEs are analysed in a more limited capacity within the panel sample data.

[45] For a complete summary of the survey carried out by the ECB and EC (see Appendix F).
[46] The six smallest nations (Cyprus, Estonia, Luxembourg, Malta, Slovakia and Slovenia) are excluded here given that these nations comprise just 2% of the euro area GDP and less than 3% of all employees in the euro area.

Table 1: Analysis of SAFE data

	% Micro	% Small	% Medium	% Large	Firms	Obs
Austria (AT)	33.2%	34.5%	24.3%	8.0%	1171	3253
Belgium (BE)	35.4%	39.5%	20.4%	4.7%	1045	2765
Germany (DE)	27.6%	32.6%	29.9%	9.9%	2642	7463
Spain (ES)	30.5%	31.0%	28.7%	9.8%	2857	7477
Finland (FI)	38.0%	39.5%	18.4%	4.1%	994	2414
France (FR)	28.8%	31.2%	30.0%	10.0%	2727	7741
Greece (GR)	42.1%	35.7%	18.6%	3.6%	1255	3190
Ireland (IE)	38.1%	38.9%	18.9%	4.1%	1139	3427
Italy (IT)	29.1%	31.4%	30.5%	9.0%	2811	8059
Netherlands (NL)	32.6%	35.8%	24.5%	7.1%	1255	3273
Portugal (PT)	32.3%	36.3%	24.9%	6.5%	1284	3629
Total	31.9%	33.8%	26.4%	7.9%	19180	52691

Source: author's own estimations utilising ECB SAFE data.

Table 1 details the 11 nations selected to be evaluated as well as the quantity of firm observations for every nation, which permits the determination of a combined quantity of observations during the 12 time periods selected from 19180 firms. Moreover, Table 1 organises the groups of firms by size and illustrates that 32% of firms can be termed micro enterprises, consisting of 1-9 employees; of particular note here is that Greece and Ireland possess the largest portions at 42.1% and 38.1% respectively. A further third of firms are classified as small enterprises (between 10 and 49 employees), which are more prevalent in Belgium, Finland and Ireland. Furthermore, marginally greater than a quarter of firms are considered medium enterprises (50 to 249 employees) with the rest of the enterprises being classified as larger firms possessing at least 250 employees.

Firms are requested to assess the availability of various categories of external financing. Such questions are especially practical since they facilitate the recognition of possibly reluctant borrowers. Questions are posed concerning bank loans, trade credit, equity, debt

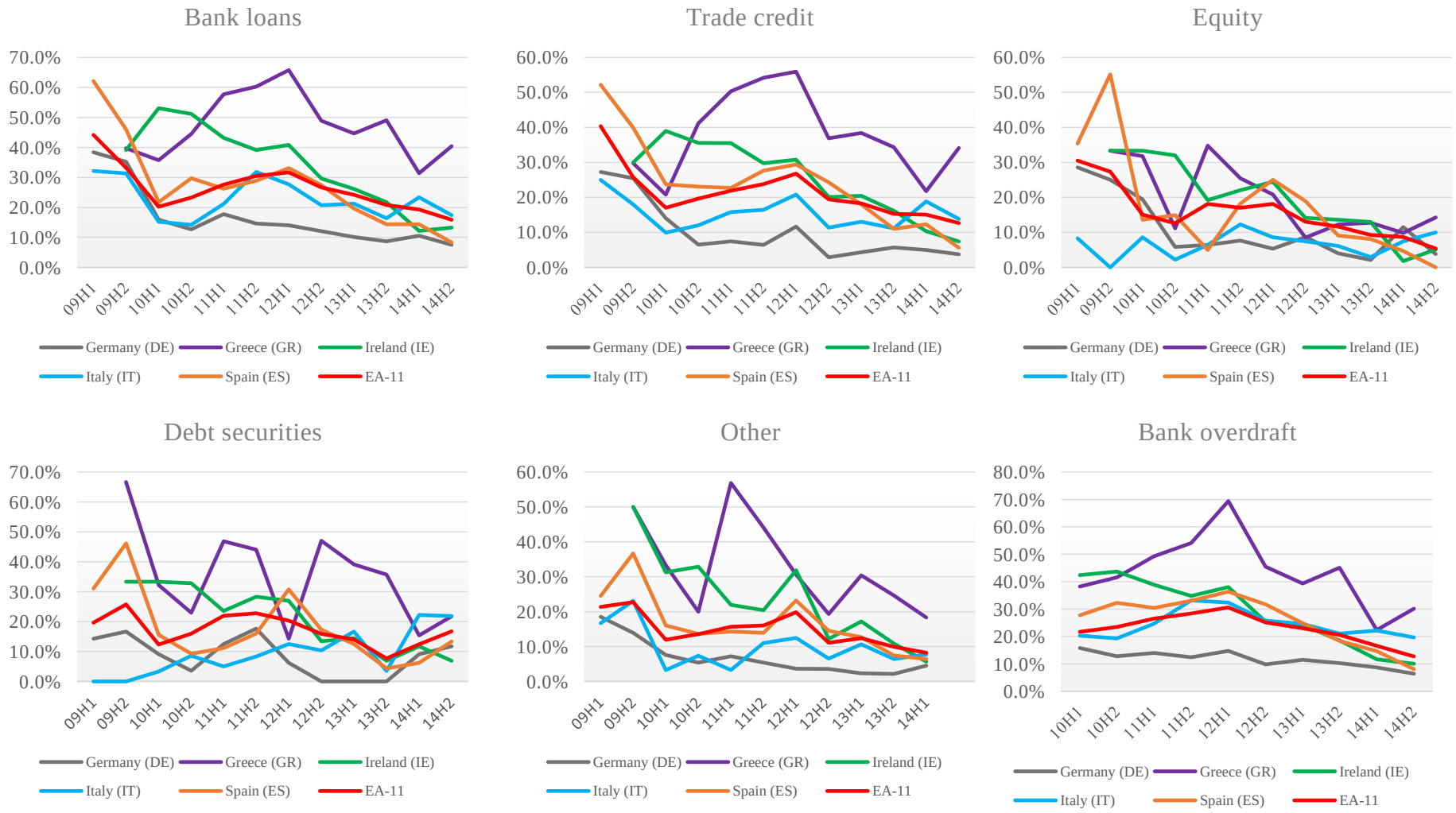
securities issued, other external financing[47] and bank overdrafts; one example of such a question is:

"*Would you say that their availability has improved, remained unchanged, deteriorated for your firm over the past 6 months?"*

In order to adequately capture the cross-country dimension of the SAFE data, Figure 1 illustrates the manner in which the proportion of firms indicating deterioration in the availability of various finance types has adjusted from 2009H1 to 2014H2 in Germany, Greece, Ireland, Italy, Spain and in the EU-11. The figure suggests heterogeneity throughout the EU-11 economies. Initially, the deterioration rates are comparatively elevated, adhering to a volatile trend. Greece and Ireland exhibit the greatest deterioration rates concerning finance options relative to the EU-11 average and most nations documented here; however, it is worth noting that German firms exhibit the lowest rates. These trends suggest that reluctant borrowers influence the rate of external financing requests or that funding is being issued for lesser quantities that initially requested. Overall, the percentage of enterprises documenting deterioration in the availability of external financing are reduced in successive waves when compared with prior waves of the SAFE survey, which coincided with the post-financial crisis period.

[47] The choice "*other*" presented here is in reference to loans issued by a related company or shareholders and from family and friends, leasing and factoring, and derived from grants.

Figure 1: Percentage of firms reporting a deterioration of financing



Source: author's own estimations utilising ECB SAFE data.

Crucial for this study is the interest in investigating the utilisation of different financing by bank lending constrained SMEs and the SAFE survey reports specific data concerning this. Table 2 depicts the percentage of firms from each nation which utilise various sources of financing, including: internal funds, grants or subsidies, trade credit, other loans (informal lending), leasing, hire purchase or factoring, debt securities, subordinated loans and equity. Given that firms can utilise several suppliers of finance, the percentages in the rows may not actually amount to 100 (see Table 2). Our investigation here is limited to the following six groups, a) trade credit, b) grants or subsidies bank loans, c) informal lending, d) market financing, e) leasing/hire purchase/factoring, f) internal funds. It is noteworthy to point out that every variable is binary; thus, each variable assumes the value of 1 if a firm employed them in the previous half-year and 0 otherwise. Yet, this rule does not apply when categorising market financing which is comprised of equity, issued debt securities or subordinated loans.

Ireland scores the highest in documented utilisation of trade credit at 58%, a nation that severely affected by the 2007-8 financial turmoil, whereas the nation with the least documented trade credit utilisation is Germany scoring only 14.5%, followed by France and Austria at 15.6% and 19.2%, respectively. Grants or subsidised bank loans financing are greatest in Spain and the Netherlands has the least amount. In terms of informal lending, the Netherlands has the highest utilisation at 17%, then Germany and Belgium at approximately 15% and 14%, respectively. Greece represented the lowest utilisation of these financing sources. Regarding market financing, Greek firms demonstrate the greatest utilisation rates, the second highest usage rates is reported by German firms while lowest rates are documented in Portuguese and Spanish firms. The country with the highest leasing/hire purchase/factoring financing is Germany while the lowest usage

occurred in Greece. Lastly, in terms of internal funds, Finland scores the highest usage at 36.1% with Portugal reporting the lowest at 4.9%.

Table 2: Sources of financing adopted by firms in EU-11

	Trade credit	Grants	Informal lending	Market financing	Leasing /hire purchase/factoring	Internal funds
Austria (AT)	19.2%	13.2%	11.1%	6.8%	44.7%	30.2%
Belgium (BE)	20.0%	10.9%	14.3%	8.6%	25.7%	17.0%
Germany (DE)	14.5%	12.7%	14.9%	10.0%	51.5%	34.7%
Spain (ES)	32.6%	17.2%	12.4%	5.5%	29.6%	22.5%
Finland (FI)	40.0%	8.2%	12.5%	8.7%	43.4%	36.1%
France (FR)	15.6%	10.4%	8.2%	6.4%	39.2%	17.2%
Greece (GR)	39.4%	10.4%	4.0%	17.1%	18.3%	15.6%
Ireland (IE)	58.0%	9.7%	13.3%	9.1%	28.6%	31.6%
Italy (IT)	39.4%	14.6%	7.7%	5.8%	29.2%	21.4%
Netherlands (NL)	25.5%	4.5%	17.0%	9.6%	39.6%	17.6%
Portugal (PT)	27.0%	16.9%	8.2%	2.8%	27.1%	4.9%
Total	28.7%	12.5%	11.0%	7.7%	35.3%	22.7%

Source: author's own estimations utilising ECB SAFE data.

Direct survey questions are utilised with the purpose of classifying bank lending constrained firms, which is well supported by several investigations which utilise a firm's view of credit to ascertain constrained firms in addition to its track record of being approved for external credit (Beck *et al*., 2006; Holton *et al*., 2013 and 2014; Casey and O'Toole, 2014; Lawless *et al*., 2015a; among others). Measures of credit constraints are divided into five categories of constrained firms as defined in Table 3. The primary questions which arise concern bank loan, credit line, bank overdraft and credit cards overdraft and are derived directly from the SAFE survey. Firms are questioned whether they applied for the aforementioned financing source. If they answer yes additional questions include if they: 1) received below 75% (rationed), 2) rejected completely (rejected) or 3) refused because the cost associated with terms and conditions was too high. We make an additional indicator by combining the previously mentioned three variables to derive a credit constrained indicator. Additionally, firms that did not apply

for bank loan and credit line are considered because of possible rejection (discouraged firm).

Table 3: Description of credit constraints measures

Constraint	Description
Credit constrained	Firms are classified as constrained if they applied for bank loan, credit line, bank overdraft and credit cards overdraft but were rejected, rationed or self-rationed.
Credit rationed	Firms are classified as rationed if they applied for bank loan, credit line, bank overdraft and credit cards overdraft but were rationed by receiving between 1% and 74%.
Credit application rejected	Firms are classified as rejected if they applied for bank loan, credit line, bank overdraft and credit cards overdraft but were rejected completely.
Self-rationed (refused because the cost was too high)	Firms are classified as self-rationed if they applied for bank loan, credit line, bank overdraft and credit cards overdraft but were refused because the cost associated with terms and conditions was too high.
Discouraged from applying	Firms are classified as discouraged if they did not apply for bank loan, credit line, bank overdraft and credit cards overdraft because of possible rejection.

Source: author's own estimations utilising ECB SAFE data.

As outlined in Table 4, the most credit constrained firms are in Greece, the Netherlands and Spain, whereas the least-constrained are in Austria, Finland and Germany. Focusing on credit rationed firms, similarly Greece indicates the highest at 26.1% with Finland reporting the lowest at 4.3%. The results for credit applications rejected is in a similar configuration as credit rationed in term of the spread over the countries. Particularly noteworthy here is that periphery countries of the EU-11 reflect the greatest amounts throughout all the different constrained measures with the Netherlands as the only exception to this. Looking at self-rationed firms, 4.9% of firms are constrained in the Netherlands followed by Greece and Ireland at 2.6%, and 2.2%, respectively. Firms in Austria and Finland are less likely to self-ration. Lastly, discouraged firms are more prevalent in Greece and Ireland, with Finland and Austria reporting the lowest level of discouraged firms.

Table 4: Analysis of various credit constraints measures by country

	Credit constrained	Credit rationed	Credit application rejected	Refused because the cost was too high	Discouraged from applying
Austria (AT)	9.7%	7.2%	1.6%	0.9%	3.0%
Belgium (BE)	16.9%	7.2%	8.2%	2.0%	6.6%
Germany (DE)	10.8%	5.0%	4.6%	1.3%	4.7%
Spain (ES)	26.4%	15.9%	9.9%	2.1%	7.8%
Finland (FI)	9.3%	4.3%	4.3%	1.0%	1.5%
France (FR)	16.9%	6.8%	9.3%	1.3%	7.4%
Greece (GR)	45.4%	26.1%	19.6%	2.6%	18.8%
Ireland (IE)	24.6%	13.8%	9.7%	2.2%	14.3%
Italy (IT)	21.9%	13.0%	8.3%	1.5%	6.0%
Netherlands (NL)	36.1%	13.6%	18.1%	4.9%	10.6%
Portugal (PT)	23.9%	13.4%	9.1%	2.0%	7.0%
Total	21.8%	11.8%	9.0%	1.8%	7.6%

Source: author's own estimations utilising ECB SAFE data.

Similar to Holton *et al.* (2014), this present study comprises GDP, the ratio of private sector credit to GDP and the yield on the 10-year sovereign bond. Beck *et al.* (2006) demonstrate that firms in nations with greater GDP per capita communicate less financing obstacles. However, there is mixed data concerning the level of private sector to GDP. Holton *et al*. (2014) demonstrate that, in nations with higher levels of private sector, small firms experience greater loan application rejection rates. Yet, these findings are in contrast with Mac an Bhaid *et al.* (2016) in which the authors stress that a greater ratio of private sector credit to GDP decreases the degree of discouragement. Additionally, increased sovereign bonds yields cause more rejection of bank loans as outlined in Holton *et al*. (2014). Accordingly, one could predict a higher level of borrower discouragement as a result of higher government bonds yields.

Following Mac an Bhaid *et al.* (2016) the bank recovery rate of credit must be factored in, since its rates are shown to be greater in firms with more collateral and therefore differ according to firm size and sector. Brown *et al*. (2011) reports that high level of interest rates appears to deter firms; this relationship is more pronounced in Eastern Europe relative to Western Europe. The increased proportion of discouraged firms in Eastern

Europe is a consequence of a greater disinclination from smaller and more monetarily-opaque firms to seek loans when compared with Western Europe, and indeed many such firms accurately predict that their loan applications will be turned down.

As outlined in Table 5, there are substantial cross-country differences among the EU-11 countries. Most notably, the level of discouragement stands at 45.6% in Ireland followed by the Netherlands and Greece at 41% and 36.4% respectively. Discouraged firms are less prevalent among the non-stressed countries of the EU-11, i.e. Finland and Austria.

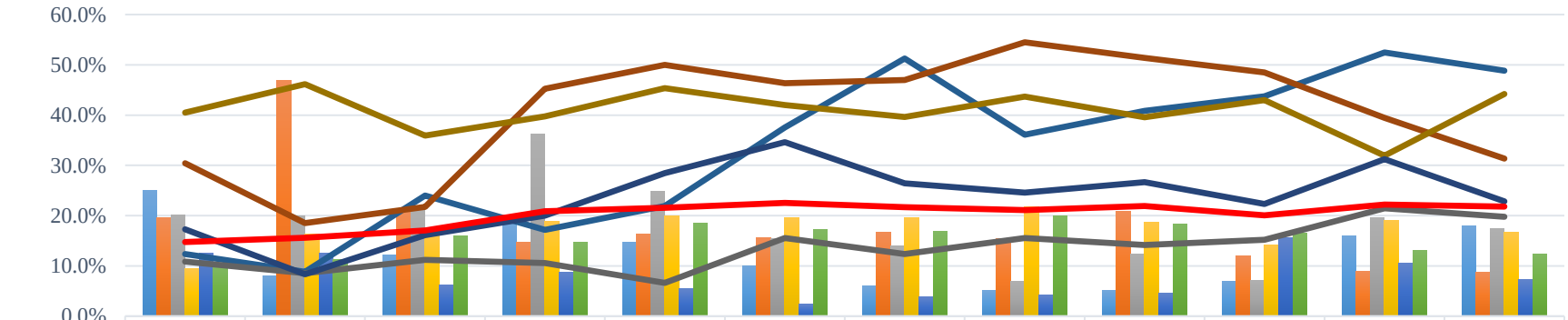
In Table 6 the rate of discouragement among EU-11 States are presented. The time frame examined in this study reveals modest growth specifically in the case of the periphery nations. For instance, the discouragement rates among Greek firms saw a 35% growth from 2009H1 to 2014H2. However, it is crucial to note that for the majority of the EU-11 core nations, the discouragement rate experiences a moderate decline within the time frame sampled, except for the Netherlands and France.

Table 5: Analysis of dependent variable by country (discouraged borrowers)

Country	Austria	Belgium	Germany	Spain	Finland	France	Greece	Ireland	Italy	Netherlands	Portugal	Total
Discouraged from applying for bank loans %	11.90%	15.70%	18.20%	17.50%	7.30%	15.40%	36.40%	45.60%	14.00%	41.00%	24.30%	20.40%

Source: author's own estimations utilising ECB SAFE data

Table 6: Analysis of discouragement rate within the EU-11 countries 2009H1-2014H2



	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7	Wave 8	Wave 9	Wave 10	Wave 11	Wave 12
AT	25.0%	8.0%	12.2%	18.4%	14.7%	10.1%	6.1%	5.0%	5.1%	6.9%	16.0%	18.0%
BE	19.7%	46.9%	20.9%	14.7%	16.3%	15.6%	16.7%	15.5%	20.8%	12.0%	8.9%	8.8%
DE	20.1%	19.9%	21.4%	36.2%	24.8%	15.5%	13.9%	7.0%	12.3%	7.1%	19.7%	17.4%
ES	9.5%	16.3%	16.6%	18.9%	19.9%	19.6%	19.6%	21.8%	18.6%	14.1%	19.1%	16.6%
FI	12.5%	12.5%	6.3%	8.7%	5.4%	2.4%	3.9%	4.3%	4.5%	15.6%	10.5%	7.3%
FR	10.0%	11.2%	16.1%	14.7%	18.4%	17.2%	17.0%	19.9%	18.3%	16.4%	13.0%	12.4%
GR	12.4%	8.8%	24.0%	17.2%	21.9%	37.6%	51.3%	36.1%	40.8%	43.7%	52.5%	48.8%
IE	30.4%	18.5%	21.7%	45.3%	50.0%	46.3%	47.0%	54.5%	51.4%	48.5%	39.4%	31.3%
IT	10.9%	8.6%	11.2%	10.6%	6.6%	15.5%	12.4%	15.5%	14.2%	15.2%	21.5%	19.8%
NL	40.5%	46.2%	35.9%	39.8%	45.4%	42.0%	39.6%	43.7%	39.6%	43.0%	31.9%	44.2%
PT	17.3%	8.3%	16.1%	20.0%	28.5%	34.6%	26.4%	24.6%	26.7%	22.3%	31.3%	22.8%
EU-11	14.8%	15.6%	17.0%	20.9%	21.6%	22.5%	21.7%	21.1%	21.9%	20.0%	22.2%	21.8%

Source: author's own estimations utilising ECB SAFE data.

Table 7: A synopsis of the predicted signs on discouraged borrowers

Variables	Description	Expected sing on discouragement	Data Source
Firm size	Defined by number of employees.	-	SAFE
<10 (Micro).			
< 50 ≤10 (Small).			
Firm age	Defined in years:	-	SAFE
10 years or more	10 years or more.		
5 to 9 years	5 years or more, but less than 10 years.		
2 to 4 years	2 years or more, but less than 5 years.		
Turnover decreased	Decrease in the level of turnover over the past 6 months.	-	SAFE
Debt to assets ratio increased	Increase in the ratio of all kinds of debt to total assets over the past 6 months.	?	SAFE
Credit history deteriorated	Deteriorated credit history (perception) over the past 6 months.	-	SAFE
Capital position deteriorated	Deteriorated own capital provided by the owners or shareholders (perception) over the past 6 months.	-	SAFE
Deteriorated prospects	Deteriorated outlook with reference to sale/profitability and business plan (perception) over the past 6 months.	-	SAFE
Deteriorated general economic outlook	Deteriorated general economic outlook, insofar as it affects the availability of external financing over the past six months.	-	SAFE
Deterioration on willingness of banks to provide loans	Willingness of banks to provide credit to your enterprise deteriorated over the past six months.	-	SAFE
Deterioration on willingness of partners to provide trade credit	Willingness of business partners to provide trade credit deteriorated over the past six months.	-	SAFE
Deterioration on willingness of investors to invest	Willingness of investors to invest in your enterprise deteriorated over the past six months.	-	SAFE
Increased need for bank loans	Firms need for bank loans increased over the past six months.	?	SAFE
Access to finance	If firm owner considers access to finance as the most important problem in the past six months.	+	SAFE
Credit line/credit cards overdraft usage	Whether the firm used credit line, bank overdraft or credit cards overdraft.	-	SAFE
Interest expenses increased	Increase in interest expenses over the past six months.	-	SAFE
Banking & macroeconomic variables			
GDP	The percentage change in GDP over half year period	-	Eurostat
Private sector credit t to GDP	Ratio of private sector credit to GDP	?	World Bank
10 year bond yield	Six month average of 10 year government bond yield	+	ECB SDW
Insolvency	Average recovery rate of credit under insolvency.	-	WBDB
Bank rate	Bank overdraft for new business, NFCs, average of 6 months	+	Bloomberg
Lerner index	Measured using balance sheet data from Bankscope.	-	Bankscope

Regulatory variables			
Control of corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "*capture*" of the state by elites and private interests. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance)	_	The WGI
Regulatory quality	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance)	_	The WGI
Rule of law	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance)	_	The WGI
Control of Corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "*capture"* of the state by elites and private interests. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance)	_	The WGI

Source: Kon and Storey, 2003; Han *et al*., 2009; Popov, 2013; Ferrando *et al*., 2015; Cowling *et al*., 2016; Mac an Bhaid *et al*., 2016, among others.

4.3.2 Model specification

Crucial for this research is the interest in investigating the utilisation of different financing by bank lending constrained SMEs following the onset of financial crisis. As a result a panel probit specification is utilised here, on the premise of a normal distribution for the functional form.[48] The methodology utilised in this study is analogous to that employed in Casey and O'Toole (2014). Given the qualitative attributes of the inquiries posed by the SAFE in addition to the fact that the dependent variables are entirely in binary, a probability choice model is an appropriate option here.

1. The equation given below represents our first model:

$$\Pr(\text{Alternative financing (Variable)}_{ijt}) = \lambda(\theta\ \text{Credit constraints}_{ijt-1} + \zeta\ \text{Firm controls}_{ijt} + \chi\text{Firm quality and creditworthiness}_{ijt} + \varepsilon_{ij})$$

Dependant variables (Alternative financing (Variable)$_{ijt}$ consist of six distinct parameters: grants or subsidised bank loans, trade credit, informal lending, leasing, hire purchase or factoring, market financing comprised of equity, issued debt securities or subordinated loans, and internal funds. Credit constraints indicates our five categories of constrained firms as defined in Table 4, the methodology employed to tackle endogeneity here is analogous to that used in Casey and O'Toole (2014) which recommends that the first lagged of bank lending constraints are used. Firm control is the vector of following firm level indicators: *firm age, size, ownership types and subsidiary status*. Firm quality and creditworthiness vector represents a wide range of variables (as outlined in Appendix. B and Table B3). Note that the country, time, sector and firm fixed-effects are present across all regressions.

Here the empirical approach consists of investigating the elements that influence firms'

[48] The utilisation of a logistic has also been tested in order to verify that the data is not vulnerable to the sampling of the distributional estimations.

external financing constraints for bank loans, trade credit, other financing and credit line. This present research hypothesis concerns the coefficient θ on the constraint variable. It can be deduced that a positive influence (θ > 0) exists; accordingly, if bank financing constraints grow, firms could resort to non-bank finance.[49]

2. The equation given below indicates our second model:

Pr (External financing constraints$_{ijt}$) = θ+ φ Firm controls$_{ijt}$ + χ Firm quality and creditworthiness$_{ijt}$ + ε_{ij}

Dependant variables (External financing constraints $_{ijt}$*)* consist of four distinct parameters: bank loans constraints, trade credit constraints, other financing constraints and credit line constraints (see Appendix. B, Table B2). Several explanatory control variables are employed with the purpose of determining a firm's age, turnover, subsidiary status and size. In addition, other variables are used to estimate a firm's quality and creditworthiness using the following measures: profit, net interest expenses, general economic outlook, access to public financial support, outlook with respect to sales and profitability (prospects), capital position, credit history, level of interest rates and level of the cost of financing as depicted in Appendix. B.

3. The equation given below indicates our third model:

Pr (External financing constraintsijt) = θ+ φ Firm controlsijt + χ Banking+ ζ Macroeconomic + Industry+ Country + Year+ εij

Dependant variables ('External financing constraints ijt'*)* denotes bank loans discouragement and is coded as one if the firm is discouraged from applying for bank

[49] The firm-level controls variables are chosen based on prior evidences which approximate the major factors firm financing decisions (Beck *et al.*, 2006; O'Toole, 2014; Casey and O'Toole 2014; among others). Additionally, several macroeconomic factors are included; these components could influence the credit market and the decision of the firm to source alternative finance and include factors such as the growth rate of GDP and the 10-year government bond rates.

loans; zero otherwise. While macroeconomic indicators contain the change in GDP, 10 year government bond yields and private sector to GDP, we also include country, time and sector dummies in every regression in our analysis similar to Beck *et al*. (2006).[50]

Several explanatory control variables are employed with the purpose of determining the age and size of a firm. Additionally, other variables are used to estimate a firm's quality and creditworthiness using the following measures: turnover, debt to asset ratio, outlook with respect to sales and profitability (prospects), capital position and credit history, which are all taken from the SAFE survey. Banking variables includes the rate of recovery in the background of insolvency, and. bank overdraft rates for new businesses, a major barometer of lending. While macroeconomic indicators contain the change in GDP, 10-year government bond yields and private sector to GDP, we also include country, time and sector dummies in every regression in our analysis.

Our analysis is further augmented by the inclusion of additional variables concerning firms' ownership status, regulatory variables, the Lerner index. Moreover, the problems are addressed here through also considering the image of willingness of banks/business partners/investors to provide credit, counting appearance of access to finance as the primary important issue, the utilisation of credit lines as a proxy to estimate information transparency. The aforementioned factors are included in Table 21.

[50] While some of the explanatory indicators could be connected, analysis to access multicollinearity show that this is not an issue because VIF factor values are <5 in every case.

4.3.3 Research hypotheses

In this research, a detailed analysis is conducted by analysing the following outlined research hypotheses in the EU-11 countries:

Hypothesis I. *Bank lending constrained SMEs show a greater tendency to demonstrate relatively more usage or requests for alternative financing.*[51]

Hypothesis II. *Older SMEs demonstrate a greater tendency to utilise trade credit whereas younger SMEs more often opt for informal lending***.**

Hypothesis III. *Smaller, younger firms are more likely to be discouraged than rejected for bank loans.*

Hypothesis IV. *Smaller, younger firms are faced with a higher level of discouragement in the periphery countries of the euro area in contrast to the Eurozone's core economies*.

The study builds on existing literature regarding the possible substitution effect between traditional bank financing and other financing options. Considering that SMEs are largely heterogeneous, it is reasonable to assume that their financing needs vary in different company life cycle stages. In line with Beck *et al.* (2006), distinct firm traits (e.g. firm size, age and ownership) are detailed with the purpose of determining if the substitution effect between the aforementioned two financing sources change a result of these firm traits. Our hypotheses, derived from the available literature on firm financing, state that firm's size and age are crucial determining factors of the scope and the kind of funding that can be accessed by the firms (Beck *et al.*, 2006; Psillaki and Daskalakis, 2009; Brown *et al*., 2011; Albareto and Russo, 2012; Holton *et al*., 2014; among others).

[51] Alternative sources of financing used in this chapter take on the following forms: trade credit, informal lending, leasing, hire purchase or factoring, market financing comprised of equity, issued debt securities or subordinated loans, and internal funds).

4.4 Empirical results

Tables 8-13 depict the marginal effects acquired via a random effects model encompassing the panel of 11 euro area countries. Particularly noteworthy is the fact that every standard error here is robust to heteroscedasticity and is appropriately clustered at the country-wave level. The opening columns contain the outcomes of the influences of various measures of bank lending constrained including (a) credit-constrained, (b) credit rationed, (c) credit-rejected, (d) self-rationed and lastly (e) credit-discouraged on firm's usage or requests for alternative financing such as trade credit, grants or subsidised bank loans, informal lending, , market financing comprised of equity, issued debt securities or subordinated loans, leasing, hire purchase or factoring and internal funds. For the sake of clarity, the terms "*discouraged"* and "*self-rationed"* are employed here to signal which sets of firms did not apply for loan due to possible rejection fear and firms that denied the loan because the cost tied to it was too high. When considering the primary groupings concerning the firm controls, manufacturing is viewed as the omitted category for firm's sector variables, more than ten years for age and publicly listed firms regarding ownership. Each of the variables utilised for this analysis is in period t data apart from constraint indicators that are incorporated into the model containing one periodic lag denoted by t-1.

4.4.1 The impact of financing constraints on the utilisation of alternative finance

Beginning with an assessment of trade credit, we do not identify any effect between our various credit-constrained measures concerning the utilisation of this financing source; this outcome is robust in both stressed and non-stressed countries of the Eurozone. Focusing on the whole sample, it is worth mentioning that the results imply that firms with prospects of deteriorating credit history show a greater tendency to utilise trade credit

provisions, similar to firms which saw a rise in net interest expenses over the previous half a year. Similar corroborating evidence is found in the case of firms which saw an increase in the level of debt to asset ratio. Concentrating on firm controls variables, it is evident that small- and medium- sized firms show a greater tendency to utilise trade credit at a rate of 7% and 18%, respectively. However, we do not find statistically significant results to suggest that older firms are more likely to use trade credit relative to younger firms.

Columns 9(a) to 9(e) investigate the effect of constraints on utilisation of grants or subsidies bank loans. A study conducted by Honohan (2010) highlights the establishment of a broad variety of policy measures globally to supplement SMEs financing after the GFC. Such policies include different credit guarantees and financing schemes. In order to sustain the effectiveness of these policies, one would predict the discovery of tendency for more requests and utilisation of these schemes in firms which are categorised as constrained in our research.

In contrast with prior expectations, an inverse significant relationship between constrained measures and the request for grant financing is determined. Such noteworthy results could imply that the contemporary provision of policy measures potentially accessible by the SMEs at the euro area level are insufficiently aimed at firms with challenging prospects for securing credit via traditional bank lending. On a related note, Casey and O'Toole (2014) document a negative association between credit rationing and usage of grant. We find that firms who experience rejected credit applications are 6% less likely to use grants financing. Stressed Eurozone countries are on average less likely to use grant financing relative to non-stressed countries. Younger firms are 8% more likely to use this source of financing, yet this outcome only holds true in the case of non-stressed countries.

Concentrating on informal lending, significant proof exists to corroborate that credit constrained, rationed and discouraged firms show a greater tendency to utilise such financing. We find that medium-sized firms are more likely to use informal lending as another aspect of their financing toolkit, compared with small-sized firms. It would be especially helpful if the SAFE data permitted the division of informal lending into dual categories of lending with the purpose of evaluating activity of a constrained firm; however, data is submitted on an aggregate basis, yet it is apparent that credit-constrained, rationed and discouraged firms have a greater tendency to use either of these financing options. When examining firm quality variables, we find that firms facing worsening credit history and capital position are more likely to utilise informal lending technique, similar to firms that saw deteriorating market conditions in terms of availability of finance. Additionally, it is determined that younger firms are 10% more likely use informal lending whereas older firms are less likely to.

Progressing to columns 11(a) to 11(e) and concentrating market financing, we find that firms who experience rejected credit applications are 2% less likely to use this source; this statistical observation only applies to stressed countries of the Eurozone. However, there is no corroborating data regarding further constrained measures. The utilisation of market financing is more prevalent in mature and medium-sized firms. We find that family or entrepreneurs and sole trader owned firms are less likely to use market financing, these findings are statistically significant at 5 and 1 percent level, respectively.

Table 12 and 13 examine the effect of constraints on utilisation of internal funds; in addition to leasing, hire purchase and factoring. The results show no direct influence between our credit-constrained measures and using the previously mentioned financing types; however, credit-constrained and rejected firms in stressed countries are less likely to utilise leasing, hire purchase and factoring. We also find that both small- and medium-

sized firms are more likely to use leasing, hire purchase and factoring by approximately 26% and 40%, respectively. Older firms are more likely to use this type of financing. Furthermore, firms whose turnover decreased in the past six months are less likely to use this source of finance; this finding is statistically significant at the 1% level. It is also worth noting that no link between firm's ownership types and the utilisation of internal funds is determined. Our results show that firms in the age group of 2 to 4 years are 4% less likely to use internal funds while our firm quality variables are insignificant in most cases.

Table 8: The impact of financing constraints on the utilisation of alternative finance - panel probit model with random effects–marginal effects.

	Trade credit (Main results)					Trade credit (Stressed countries)					Trade credit (Non-stressed countries)				
	8(a)	8(b)	8(c)	8(d)	8(e)	8(a)	8(b)	8(c)	8(d)	8(e)	8(a)	8(b)	8(c)	8(d)	8(e)
Credit constrained $_{t-1}$	0.003					-0.014					0.020				
Credit rationed $_{t-1}$		0.013					0.010					0.012			
Credit application rejected $_{t-1}$			-0.004					-0.020					0.019		
Refused because the cost was too high $_{t-1}$				0.015					0.003					0.028	
Discouraged from applying $_{t-1}$					0.002					-0.017					0.018
Control for firm quality															
Capital position deteriorated	-0.014	-0.018	-0.016	-0.018	-0.014	-0.024	-0.033	-0.028	-0.033	-0.024	-0.002	-0.001	-0.003	-0.001	-0.002
Credit history deteriorated	0.031*	0.035*	0.039*	0.035*	0.032*	0.008	0.008	0.015	0.009	0.008	0.055**	0.062**	0.059**	0.062**	0.056**
Debt compared to assets increased	0.030*	0.026	0.035*	0.026	0.029*	0.030	0.036	0.043*	0.036	0.030	0.023	0.013	0.023	0.014	0.023
Increased net interest expenses	0.048***	0.060***	0.056***	0.060***	0.048***	0.056***	0.076***	0.072***	0.076***	0.056***	0.021	0.020	0.017	0.020	0.022
Profit decreased	-0.014	-0.018	-0.020	-0.018	-0.014	-0.019	-0.031	-0.035	-0.031	-0.019	-0.003	0.002	0.001	0.002	-0.003
Turnover decreased	-0.034*	-0.040**	-0.042**	-0.040**	-0.034*	-0.055**	-0.062**	-0.066**	-0.062**	-0.055**	0.007	0.000	-0.001	0.000	0.007
Deteriorated general economic outlook	0.070***	0.072***	0.071***	0.072***	0.070***	0.114***	0.113***	0.110***	0.113***	0.114***	0.007	0.012	0.015	0.012	0.008
Deteriorated public fund access	-0.004	-0.004	-0.005	-0.004	-0.004	-0.006	0.000	-0.002	0.000	-0.006	-0.011	-0.014	-0.015	-0.014	-0.010
Deteriorated prospects	0.026	0.020	0.023	0.020	0.026	0.029	0.022	0.027	0.022	0.029	0.022	0.019	0.019	0.019	0.022
Firm controls variables															
Family or entrepreneurs	0.077*	0.045	0.044	0.045	0.077*	0.081	0.056	0.065	0.056	0.081	0.049	0.009	0.000	0.009	0.048
Other enterprises or business associates	0.093*	0.073	0.067	0.073	0.093*	0.105*	0.090	0.090	0.090	0.105*	0.053	0.027	0.017	0.027	0.053
VC or business Angels	0.054	0.050	0.030	0.049	0.054	0.085	0.113	0.089	0.112	0.086	0.025	-0.008	-0.019	-0.009	0.025
Sole Trader	0.014	-0.012	-0.009	-0.012	0.014	-0.013	-0.037	-0.021	-0.036	-0.013	0.018	-0.016	-0.023	-0.016	0.017
Other	-0.044	-0.067	-0.077	-0.067	-0.044	-0.031	-0.063	-0.083	-0.062	-0.031	-0.044	-0.062	-0.061	-0.062	-0.046
5 to 9 years	-0.047**	-0.044*	-0.040*	-0.044*	-0.047**	-0.051*	-0.058*	-0.057*	-0.058*	-0.051*	-0.030	-0.021	-0.014	-0.021	-0.029
2 to 4 years	-0.002	-0.012	-0.006	-0.011	-0.002	0.018	-0.013	-0.001	-0.013	0.018	-0.015	-0.007	-0.008	-0.007	-0.014
Less than 2 years	-0.068	-0.072	-0.073	-0.072	-0.068	-0.111	-0.102	-0.117	-0.102	-0.111	-0.043	-0.053	-0.046	-0.053	-0.042
Small	0.076***	0.081***	0.076***	0.081***	0.076***	0.077***	0.084***	0.080***	0.084***	0.077***	0.055**	0.056**	0.052**	0.056**	0.055**
Medium	0.187***	0.189***	0.186***	0.189***	0.187***	0.189***	0.196***	0.196***	0.196***	0.189***	0.140***	0.135***	0.131***	0.135***	0.139***
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15262	12872	12013	12872	15262	8242	6836	6264	6836	8242	7020	6036	5749	6036	7020

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. Country, time and sector dummies are present in every regressions, yet are not depicted. Time varying country controls are comprised of the growth of GDP and the 10 year sovereign bond yield. * p < 0.1, ** p < 0:05, *** p < 0:01.

Table 9: The impact of financing constraints on the utilisation of alternative finance - panel probit model with random effects–marginal effects.

	Grants or subsidies bank loans (Main results)					Grants or subsidies bank loans (Stressed countries)					Grants or subsidies bank loans (Non-stressed countries)				
	9(a)	9(b)	9(c)	9(d)	9(e)	9(a)	9(b)	9(c)	9(d)	9(e)	9(a)	9(b)	9(c)	9(d)	9(e)
Credit constrained $_{t-1}$	-0.039***					-0.043***					-0.034***				
Credit rationed $_{t-1}$		-0.015					-0.013					-0.022			
Credit application rejected $_{t-1}$			-0.063***					-0.074***					-0.050***		
Refused because the cost was too high $_{t-1}$				-0.071***					-0.090**					-0.047	
Discouraged from applying $_{t-1}$					-0.027***					-0.025*					-0.028**
Control for firm quality															
Capital position deteriorated	-0.023**	-0.022*	-0.027**	-0.022*	-0.024**	-0.041**	-0.047**	-0.053***	-0.046**	-0.042***	-0.005	0.003	-0.001	0.002	-0.005
Credit history deteriorated	0.010	0.012	0.020	0.012	0.009	0.007	0.009	0.022	0.008	0.005	0.016	0.016	0.019	0.016	0.015
Debt compared to assets increased	0.051***	0.057***	0.057***	0.057***	0.052***	0.063***	0.074***	0.073***	0.074***	0.064***	0.034***	0.035**	0.037***	0.035**	0.034***
Increased net interest expenses	0.053***	0.055***	0.055***	0.055***	0.052***	0.058***	0.064***	0.065***	0.063***	0.057***	0.044***	0.042***	0.043***	0.042***	0.042***
Profit decreased	-0.003	0.002	-0.001	0.002	-0.003	0.001	0.004	0.000	0.004	0.001	-0.009	-0.001	-0.003	-0.002	-0.008
Turnover decreased	-0.009	-0.016	-0.014	-0.017	-0.009	-0.012	-0.021	-0.018	-0.022	-0.012	-0.009	-0.015	-0.015	-0.015	-0.009
Deteriorated general economic outlook	-0.008	-0.017*	-0.015	-0.016	-0.008	-0.006	-0.020	-0.020	-0.020	-0.007	-0.008	-0.012	-0.008	-0.012	-0.009
Deteriorated public fund access	0.015	0.016	0.022*	0.016	0.014	0.007	0.007	0.013	0.007	0.006	0.024*	0.027*	0.033**	0.027*	0.022*
Deteriorated prospects	-0.009	-0.007	-0.009	-0.007	-0.010	-0.012	-0.006	-0.008	-0.005	-0.013	-0.006	-0.008	-0.011	-0.009	-0.006
Firm controls variables															
Family or entrepreneurs	0.026	0.034	0.035	0.034	0.027	0.038	0.036	0.042	0.036	0.038	0.013	0.033	0.028	0.034	0.014
Other enterprises or business associates	-0.011	-0.013	-0.013	-0.012	-0.011	0.013	-0.005	-0.001	-0.004	0.013	-0.022	-0.008	-0.014	-0.008	-0.022
VC or business Angels	0.025	0.058	0.080	0.060	0.026	-0.016	-0.008	0.027	-0.005	-0.016	0.062	0.127*	0.120*	0.129*	0.063
Sole Trader	-0.006	-0.003	0.001	-0.004	-0.006	-0.008	-0.013	0.002	-0.015	-0.010	-0.005	0.011	0.005	0.011	-0.004
Other	0.102**	0.104*	0.106*	0.103*	0.104**	0.063	0.049	0.057	0.047	0.063	0.130**	0.168**	0.155**	0.170**	0.134**
5 to 9 years	0.011	0.009	0.008	0.008	0.010	0.034*	0.038*	0.041*	0.038*	0.032*	-0.007	-0.015	-0.018	-0.015	-0.008
2 to 4 years	-0.003	-0.004	0.001	-0.005	-0.005	-0.039	-0.052*	-0.042	-0.052*	-0.039	0.029	0.038*	0.037	0.037*	0.027
Less than 2 years	0.078*	0.074*	0.068	0.075*	0.077*	-0.039	-0.028	0.002	-0.029	-0.040	0.102**	0.087*	0.071*	0.089*	0.101**
Small	0.045***	0.051***	0.045***	0.051***	0.046***	0.045***	0.045**	0.036*	0.045**	0.047***	0.040***	0.052***	0.050***	0.052***	0.040***
Medium	0.104***	0.109***	0.100***	0.108***	0.106***	0.109***	0.113***	0.103***	0.111***	0.111***	0.092***	0.102***	0.096***	0.102***	0.093***
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15262	12872	12013	12872	15262	8242	6836	6264	6836	8242	7020	6036	5749	6036	7020

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. Country, time and sector dummies are present in every regressions, yet are not depicted. Time varying country controls are comprised of the growth of GDP and the 10 year sovereign bond yield. * p < 0.1, ** p < 0:05, *** p < 0:01.

Table 10: The impact of financing constraints on the utilisation of alternative finance - panel probit model with random effects–marginal effects.

	Other loan (Main results)					Other loan (Stressed countries)					Other loan (Non-stressed countries)				
	10(a)	10(b)	10(c)	10(d)	10(e)	10(a)	10(b)	10(c)	10(d)	10(e)	10(a)	10(b)	10(c)	10(d)	10(e)
Credit constrained $_{t-1}$	0.024***					0.019**					0.031***				
Credit rationed $_{t-1}$		0.016*					0.009					0.035**			
Credit application rejected $_{t-1}$			0.030***					0.018*					0.055***		
Refused because the cost was too high $_{t-1}$				0.001					0.004					-0.003	
Discouraged from applying $_{t-1}$					0.013*					0.013					0.013
Control for firm quality															
Capital position deteriorated	0.020**	0.019**	0.018**	0.019**	0.020**	0.018*	0.020*	0.019*	0.020*	0.018*	0.020*	0.015	0.014	0.015	0.020*
Credit history deteriorated	0.040***	0.037***	0.039***	0.038***	0.040***	0.028***	0.029***	0.029**	0.029***	0.029***	0.064***	0.055***	0.059***	0.057***	0.066***
Debt compared to assets increased	0.019***	0.018**	0.017**	0.017**	0.019***	0.017*	0.016*	0.015*	0.015*	0.016*	0.020*	0.018*	0.018*	0.018*	0.020*
Increased net interest expenses	0.030***	0.029***	0.029***	0.029***	0.030***	0.024***	0.024***	0.024***	0.024***	0.024***	0.040***	0.037***	0.037***	0.037***	0.041***
Profit decreased	-0.003	-0.007	-0.006	-0.007	-0.003	0.000	-0.004	-0.002	-0.003	0.000	-0.008	-0.011	-0.010	-0.011	-0.007
Turnover decreased	0.004	0.004	0.006	0.004	0.004	0.002	0.001	0.004	0.001	0.002	0.007	0.009	0.010	0.009	0.007
Deteriorated general economic outlook	0.010	0.010	0.009	0.009	0.010	0.009	0.006	0.005	0.006	0.009	0.009	0.012	0.012	0.012	0.010
Deteriorated public fund access	0.013*	0.013*	0.015*	0.013*	0.013*	0.013	0.012	0.017*	0.012	0.013	0.013	0.015	0.013	0.015	0.014
Deteriorated prospects	0.003	0.003	0.002	0.004	0.003	0.004	0.004	0.002	0.004	0.004	0.002	0.002	0.002	0.003	0.002
Firm controls variables															
Family or entrepreneurs	-0.041**	-0.039**	-0.043**	-0.039**	-0.041**	-0.046**	-0.050**	-0.058**	-0.050**	-0.046**	-0.038	-0.030	-0.029	-0.029	-0.040*
Other enterprises or business associates	0.001	0.004	0.002	0.005	0.001	0.006	0.006	0.001	0.006	0.006	-0.007	0.001	0.004	0.002	-0.008
VC or business Angels	-0.018	-0.027	-0.026	-0.027	-0.018	-0.007	-0.013	-0.006	-0.013	-0.007	-0.029	-0.035	-0.036	-0.036	-0.030
Sole Trader	-0.052***	-0.049***	-0.051***	-0.048***	-0.051***	-0.043**	-0.040**	-0.043**	-0.040**	-0.042**	-0.064***	-0.056**	-0.057**	-0.056**	-0.065***
Other	-0.019	-0.020	-0.022	-0.019	-0.020	-0.006	-0.008	-0.009	-0.007	-0.006	-0.032	-0.029	-0.031	-0.029	-0.033
5 to 9 years	0.016*	0.011	0.012	0.011	0.017*	0.020*	0.017	0.016	0.017	0.020*	0.008	0.001	0.003	0.001	0.010
2 to 4 years	0.045***	0.047***	0.046***	0.047***	0.046***	0.037*	0.046**	0.037*	0.046**	0.037*	0.046**	0.042**	0.046**	0.043**	0.049**
Less than 2 years	0.104***	0.086**	0.100***	0.086**	0.104***	0.130**	0.090	0.085	0.089	0.131**	0.099**	0.089**	0.117**	0.091**	0.099**
Small	0.017**	0.010	0.012	0.010	0.016**	0.016	0.008	0.011	0.008	0.015	0.019*	0.012	0.014	0.012	0.018*
Medium	0.049***	0.043***	0.044***	0.043***	0.047***	0.040***	0.035***	0.037***	0.035***	0.040***	0.060***	0.052***	0.051***	0.052***	0.057***
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15262	12872	12013	12872	15262	8242	6836	6264	6836	8242	7020	6036	5749	6036	7020

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. Country, time and sector dummies are present in every regressions, yet are not depicted. Time varying country controls are comprised of the growth of GDP and the 10 year sovereign bond yield. * p < 0.1, ** p < 0:05, *** p < 0:01.

Table 11: The impact of financing constraints on the utilisation of alternative finance - panel probit model with random effects–marginal effects.

	Market financing (Main results)					Market financing (Stressed countries)					Market financing (Non-stressed countries)				
	11(a)	11(b)	11(c)	11(d)	11(e)	11(a)	11(b)	11(c)	11(d)	11(e)	11(a)	11(b)	11(c)	11(d)	11(e)
Credit constrained $_{t-1}$	0.001					-0.002					0.002				
Credit rationed $_{t-1}$		0.011					0.011					0.007			
Credit application rejected $_{t-1}$			-0.007					-0.018*					0.012		
Refused because the cost was too high $_{t-1}$				0.004					0.007					-0.003	
Discouraged from applying $_{t-1}$					0.002					0.005					-0.003
Control for firm quality															
Capital position deteriorated	0.010	0.016**	0.016*	0.016**	0.010	0.002	0.008	0.005	0.008	0.002	0.019*	0.023*	0.025*	0.023*	0.019*
Credit history deteriorated	0.014*	0.008	0.006	0.008	0.014*	0.015*	0.010	0.006	0.010	0.014*	0.017	0.008	0.011	0.008	0.017
Debt compared to assets increased	0.008	0.007	0.006	0.007	0.008	0.000	-0.002	-0.003	-0.002	0.000	0.018*	0.019*	0.018*	0.019*	0.018*
Increased net interest expenses	0.019***	0.019***	0.020***	0.019***	0.019***	0.017**	0.017**	0.017**	0.017**	0.017**	0.020**	0.020**	0.023**	0.020**	0.020**
Profit decreased	-0.001	-0.001	-0.001	0.000	-0.001	-0.001	-0.004	-0.002	-0.004	-0.001	-0.002	0.002	-0.001	0.002	-0.002
Turnover decreased	-0.007	-0.009	-0.009	-0.009	-0.007	-0.009	-0.008	-0.010	-0.008	-0.009	-0.005	-0.008	-0.006	-0.008	-0.005
Deteriorated general economic outlook	-0.007	-0.006	-0.006	-0.006	-0.007	-0.004	0.000	0.000	0.000	-0.004	-0.010	-0.013	-0.013	-0.013	-0.010
Deteriorated public fund access	0.020***	0.020***	0.021***	0.020***	0.020***	0.016*	0.014	0.016*	0.015	0.016*	0.025**	0.026**	0.025**	0.026**	0.025**
Deteriorated prospects	0.006	0.004	0.004	0.004	0.006	0.002	-0.005	-0.005	-0.005	0.002	0.013	0.017*	0.020*	0.018*	0.013
Firm controls variables															
Family or entrepreneurs	-0.039***	-0.038**	-0.040**	-0.038**	-0.038***	-0.029*	-0.026	-0.026	-0.026	-0.028*	-0.045**	-0.049**	-0.054**	-0.049**	-0.046**
Other enterprises or business associates	-0.021*	-0.019	-0.020	-0.019	-0.021*	-0.006	-0.005	-0.005	-0.005	-0.006	-0.032*	-0.033*	-0.035*	-0.033*	-0.032*
VC or business Angels	-0.003	-0.001	0.003	-0.001	-0.003	-0.017	-0.023	-0.022	-0.023	-0.018	0.005	0.009	0.013	0.009	0.004
Sole Trader	-0.045***	-0.042***	-0.042***	-0.042***	-0.045***	-0.031*	-0.027*	-0.023	-0.027	-0.031*	-0.059***	-0.058***	-0.062***	-0.058***	-0.059***
Other	-0.005	0.003	-0.001	0.003	-0.005	-0.014	-0.003	-0.013	-0.003	-0.014	0.000	0.005	0.006	0.004	0.000
5 to 9 years	0.014*	0.014*	0.015*	0.014*	0.014*	0.019*	0.018	0.020*	0.018	0.019*	0.011	0.009	0.009	0.009	0.011
2 to 4 years	0.019*	0.017	0.015	0.017	0.019*	0.001	0.000	-0.003	0.000	0.000	0.031*	0.026	0.024	0.026	0.031*
Less than 2 years	0.037	0.035	0.044	0.035	0.037	-0.042	-0.048	-0.042	-0.048	-0.042	0.074**	0.073*	0.082**	0.074*	0.073**
Small	0.016**	0.016**	0.014*	0.016**	0.016**	0.019**	0.019*	0.014	0.019*	0.020**	0.012	0.010	0.012	0.010	0.011
Medium	0.034***	0.034***	0.033***	0.034***	0.034***	0.036***	0.033***	0.032***	0.033***	0.037***	0.031***	0.033***	0.033**	0.032***	0.030***
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15262	12872	12013	12872	15262	8242	6836	6264	6836	8242	7020	6036	5749	6036	7020

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. Country, time and sector dummies are present in every regressions, yet are not depicted. Time varying country controls are comprised of the growth of GDP and the 10 year sovereign bond yield. * p < 0.1, ** p < 0:05, *** p < 0:01.

Table 12: The impact of financing constraints on the utilisation of alternative finance - panel probit model with random effects–marginal effects.

	Internal funds (Main results)					Internal funds (Stressed countries)					Internal funds (Non-stressed countries)				
	12(a)	12(b)	12(c)	12(d)	12(e)	12(a)	12(b)	12(c)	12(d)	12(e)	12(a)	12(b)	12(c)	12(d)	12(e)
Credit constrained $_{t-1}$	0.013					-0.006					0.042**				
Credit rationed $_{t-1}$		0.015					-0.002					0.045			
Credit application rejected $_{t-1}$			0.011					-0.001					0.039		
Refused because the cost was too high $_{t-1}$				0.052					0.045					0.050	
Discouraged from applying $_{t-1}$					0.011					0.006					0.023
Control for firm quality															
Capital position deteriorated	0.011	0.006	0.002	0.006	0.011	0.009	0.001	-0.002	0.001	0.008	0.015	0.014	0.008	0.014	0.015
Credit history deteriorated	-0.014	-0.026*	-0.025	-0.026*	-0.014	-0.037**	-0.049**	-0.047**	-0.049**	-0.037**	0.022	0.012	0.008	0.013	0.024
Debt compared to assets increased	0.005	0.000	0.006	0.000	0.005	0.016	0.012	0.016	0.012	0.016	-0.015	-0.020	-0.010	-0.020	-0.016
Increased net interest expenses	0.003	0.005	0.007	0.006	0.004	0.001	0.007	0.005	0.007	0.001	0.001	-0.001	0.004	-0.001	0.002
Profit decreased	-0.01	-0.011	-0.012	-0.011	-0.010	0.006	0.004	0.003	0.004	0.006	-0.032*	-0.033	-0.031	-0.033*	-0.032*
Turnover decreased	-0.018	-0.014	-0.016	-0.014	-0.018	-0.034**	-0.035*	-0.035*	-0.035*	-0.034**	0.004	0.014	0.006	0.013	0.004
Deteriorated general economic outlook	0.027**	0.031**	0.032**	0.031**	0.027**	0.035**	0.028*	0.027	0.028*	0.035**	0.019	0.034*	0.039*	0.034*	0.020
Deteriorated public fund access	0.008	0.010	0.012	0.010	0.008	0.009	0.013	0.015	0.013	0.009	0.002	0.008	0.009	0.008	0.004
Deteriorated prospects	0.023*	0.028*	0.028*	0.028*	0.023*	0.032*	0.041**	0.046	0.041**	0.032*	0.007	0.007	0.001	0.007	0.007
Firm controls variables															
Family or entrepreneurs	0.020	0.010	0.003	0.010	0.020	-0.001	-0.021	-0.030	-0.021	-0.001	0.062	0.064	0.060	0.064	0.060
Other enterprises or business associates	0.001	-0.017	-0.024	-0.018	0.001	0.003	-0.019	-0.028	-0.020	0.003	0.023	0.013	0.013	0.013	0.022
VC or business Angels	0.052	0.040	0.044	0.039	0.052	-0.024	-0.009	0.014	-0.009	-0.024	0.159*	0.121	0.103	0.120	0.158**
Sole Trader	-0.004	-0.022	-0.026	-0.022	-0.004	-0.024	-0.059	-0.061	-0.059	-0.024	0.039	0.042	0.039	0.042	0.038
Other	0.113*	0.089	0.059	0.090	0.112*	0.114	0.088	0.049	0.089	0.114	0.142*	0.130	0.109	0.128	0.138
5 to 9 years	-0.024	-0.034*	-0.026	-0.034*	-0.024	-0.009	-0.018	-0.007	-0.019	-0.009	-0.038	-0.050	-0.046*	-0.050*	-0.037
2 to 4 years	-0.04*	-0.031	-0.026	-0.030	-0.040*	-0.068**	-0.051	-0.048	-0.051	-0.068**	-0.001	0.001*	0.007	0.003	0.002
Less than 2 years	-0.015	0.002	0.010	0.002	-0.015	-0.085	-0.029	-0.008	-0.028	-0.085	0.003	-0.015	-0.014	-0.015	0.003
Small	0.059***	0.065***	0.066***	0.065***	0.059***	0.04**	0.053**	0.060***	0.054***	0.041**	0.085***	0.080***	0.075***	0.080***	0.084***
Medium	0.118***	0.122***	0.126***	0.123***	0.118***	0.079***	0.094***	0.104***	0.095***	0.080***	0.174***	0.162***	0.160***	0.162***	0.171***
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15262	12872	12013	12872	15262	8242	6836	6264	6836	8242	7020	6036	5749	6036	7020

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. Country, time and sector dummies are present in every regressions, yet are not depicted. Time varying country controls are comprised of the growth of GDP and the 10 year sovereign bond yield. * p < 0.1, ** p < 0:05, *** p < 0:01.

Table 13: The impact of financing constraints on the utilisation of alternative finance - panel probit model with random effects–marginal effects.

	Leasing or hire purchase or factoring (Main results)					Leasing or hire purchase or factoring (Stressed countries)					Leasing or hire purchase or factoring (Non-stressed countries)				
	13(a)	13(b)	13(c)	13(d)	13(e)	13(a)	13(b)	13(c)	13(d)	13(e)	13(a)	13(b)	13(c)	13(d)	13(e)
Credit constrained $_{t-1}$	-0.021					-0.024*					-0.009				
Credit rationed $_{t-1}$		-0.016					-0.013					-0.019			
Credit application rejected $_{t-1}$			-0.040*					-0.048*					-0.007		
Refused because the cost was too high $_{t-1}$				-0.015					0.017					-0.072	
Discouraged from applying $_{t-1}$					-0.007					-0.010					0.002
Control for firm quality															
Capital position deteriorated	-0.011	0.002	0.006	0.002	-0.012	-0.020	-0.016	-0.018	-0.016	-0.021	0.005	0.027	0.041	0.026	0.005
Credit history deteriorated	0.010	0.008	0.009	0.007	0.009	0.012	0.012	0.015	0.012	0.011	0.010	0.002	-0.002	0.003	0.009
Debt compared to assets increased	0.059***	0.066***	0.065***	0.066***	0.059***	0.042**	0.044**	0.042**	0.044**	0.043**	0.077**	0.094***	0.090***	0.094***	0.077**
Increased net interest expenses	0.059***	0.061***	0.060***	0.061***	0.059***	0.055***	0.062***	0.063***	0.062***	0.054***	0.060**	0.057*	0.049*	0.057*	0.060**
Profit decreased	-0.005	0.000	-0.001	0.000	-0.005	-0.003	0.000	-0.003	0.000	-0.003	-0.011	-0.005	-0.002	-0.005	-0.011
Turnover decreased	-0.060***	-0.067***	-0.061***	-0.067***	-0.060***	-0.051***	-0.065***	-0.057***	-0.064***	-0.051***	-0.078**	-0.069*	-0.067*	-0.069*	-0.078**
Deteriorated general economic outlook	0.020	0.015	0.017	0.015	0.019	0.012	0.004	0.005	0.004	0.012	0.024	0.023	0.022	0.023	0.024
Deteriorated public fund access	0.019	0.018	0.012	0.018	0.018	0.027	0.036*	0.035*	0.036*	0.026	0.005	-0.011	-0.026	-0.011	0.004
Deteriorated prospects	-0.011	-0.009	-0.009	-0.009	-0.011	-0.015	-0.013	-0.011	-0.014	-0.015	-0.007	-0.003	-0.009	-0.003	-0.007
Firm controls variables															
Family or entrepreneurs	-0.016	-0.010	-0.005	-0.010	-0.015	-0.008	-0.019	-0.004	-0.019	-0.008	-0.026	0.022	-0.003	0.022	-0.025
Other enterprises or business associates	0.009	-0.003	0.010	-0.003	0.009	-0.026	-0.053	-0.034	-0.053	-0.026	0.063	0.094	0.077	0.094	0.064
VC or business Angels	0.076	0.051	0.058	0.051	0.077	0.013	-0.021	-0.024	-0.021	0.013	0.160	0.167	0.163	0.168	0.161
Sole Trader	-0.040	-0.039	-0.032	-0.039	-0.040	-0.033	-0.049	-0.029	-0.050	-0.034	-0.039	0.007	-0.019	0.007	-0.039
Other	-0.007	-0.041	-0.030	-0.042	-0.006	-0.002	-0.048	-0.029	-0.049	-0.001	-0.012	-0.012	-0.030	-0.011	-0.011
5 to 9 years	0.039*	0.026	0.031	0.025	0.038*	0.061**	0.045*	0.051*	0.045*	0.060**	-0.006	-0.010	-0.007	-0.010	-0.007
2 to 4 years	0.038	0.036	0.032	0.035	0.037	0.021	0.005	-0.005	0.005	0.020	0.057	0.068	0.068	0.067	0.056
Less than 2 years	0.058	0.046	0.050	0.046	0.058	0.029	0.024	0.037	0.025	0.030	0.088	0.067	0.069	0.068	0.088
Small	0.259***	0.258***	0.254***	0.258***	0.260***	0.216***	0.205***	0.198***	0.205***	0.217***	0.299***	0.312***	0.307***	0.312***	0.300***
Medium	0.393***	0.397***	0.393***	0.396***	0.395***	0.337***	0.336***	0.329***	0.336***	0.338***	0.443***	0.448***	0.444***	0.447***	0.444***
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15262	12872	12013	12872	15262	8242	6836	6264	6836	8242	7020	6036	5749	6036	7020

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. Country, time and sector dummies are present in every regressions, yet are not depicted. Time varying country controls are comprised of the growth of GDP and the 10 year sovereign bond yield. * p < 0.1, ** p < 0:05, *** p < 0:01.

4.4.2 The determinants of external financing obstacles

Table 14-17 contain the influences of (a) firm controls and (b) firm quality and creditworthiness on external financing constraints for bank loans, trade credit, other financing and credit line. Here different age classifications are utilised according to the SAFE data, which are grouped according to the number of active years; these are: 1) 10 years or more, 2) 5 to 9 years and 3) 2 to 4 years. The availability of external financing is contingent on several contributing elements. With this in mind, the effects of a substantial variety of supplemental variables are considered.

Table 14 demonstrates that micro and younger firms are relatively more prone to having applications for bank loans rejected; this outcome supports the results from the seminal research conducted by Beck *et al*. (2006) which corroborates the practicality of using a firm's size and age as inferable estimations of financing constraints. Comparably, Holton *et al*. (2013) determine that micro firms and firms recording low turnover show a greater tendency to be rejected in the Eurozone. Furthermore, a study by Andrieu *et al*. (2015) indicates that age and size are directly proportional to debt capacity. Young and small firms are more likely to be rejected given the greater moral hazard they pose for a bank. Brown *et al.* (2011) additionally propose that smaller firms could endure more restricted investment prospects relative to the large firms. These findings are robust in both stressed and non-stressed countries of the Eurozone. When examining variables representing firm quality and creditworthiness, firms that have reported deteriorated credit history, capital position and prospect with respect to sales, profitability or business plan are additionally more prone to be rejected and self-rationed. This deduction is in keeping with a study by Ferrando and Mulier (2015) demonstrating that low-profit firms show a greater tendency to experience actual financing constraints. We find similar evidence in our research

concerning both stressed and non-stressed countries of euro area. Moreover, firms reporting a reduction in turnover are also more likely to face bank loans rejection.

Table 15 upholds the previous findings for bank loans rejection and suggests that micro firms are more likely to be rejected for a trade credit when compared with small firms. Yet, there are no concrete findings to indicate significant differences between various categories of a firm's age and our various constrained measures for trade credit. This deduction is in contrast to the conclusions in Andrieu *et al*. (2015) derived from Flash Eurobarometer Survey on access to finance from the EC, which implies that just the very young firms experience more constraints for trade credit. We find that firms in construction sector are more likely to face trade credit rejection. Furthermore, our results suggest that firms that reported deteriorating credit history and capital position are more likely to be rationed and rejected for trade credit; however, this outcome is more relevant to the periphery countries of the Eurozone. On a related note, Biais and Gollier (1997) offers an analytical model demonstrating that the supply of trade credit shows the creditworthiness of the customer.

Focusing on other external financing which encompass wide range of financing possibilities such as peer-to-peer lending, crowdfunding and loans from a related company (see footnotes: 35), there is no significant evidence for the prevalence of firm's ages unlike the trend for bank loans. Additionally, micro and small firms operating in industry sector are more prone to experience rejection for other financing, these findings only hold true when reflecting the whole sample and the sub-sample designated for stressed countries of euro area.

As for credit line, the data indicates that smaller and younger firms are approximately 3% more likely to face rejection for a credit line. The results for firm's size and age are

corroborated with bank loans, as these categories are statistically significant. The turnover here is inversely proportional to credit line rejection, which means that as firms' turnovers decrease the percentage of firms reporting a rejection for credit lines increases. When taking further factors concerning firm quality into account, the outcomes documented in Table 17 are in keeping Table 14; consequently, these results will not be additionally elaborated upon.

Utilising Germany as a reference nation, the country dummies in the bank loans regression are significant in addition to being positive for Spain, Greece, Ireland, Italy, the Netherlands and Portugal; this demonstrates an increased likelihood of firms in the aforementioned countries having loans being constrained. Other financing and credit lines dummies adhered to a format comparable with bank loans regressions, with France and Belgium being the exceptions in which dummies are significant and positive. Finally, trade credit dummies are significant and positive in nearly every case apart from Austria and Finland. Crucially, the country time dummies for these regressions are not illustrated, yet are basically all statistically significant.

Table 14: Baseline specification on external financing usage- panel probit model with random effects–marginal effects.

Bank loans	Main results			Stressed countries			Non-stressed countries		
(excluding overdraft and credit lines)	Rationed	Rejected	Self-rationed	Rationed	Rejected	Self-rationed	Rationed	Rejected	Self-rationed
Firm size									
<10 (Micro)	-0.009*	0.044***	0.013***	-0.043***	0.064***	0.010***	0.009*	0.015***	0.019***
< 50 ≤10 (Small)	-0.003	0.010**	0.007***	-0.012	0.017*	0.005*	0.003	0.002*	0.012*
Firm age									
10 years or more	0.003	-0.009	0.000	-0.011	-0.031	0.003	0.005	0.000	-0.002
5 to 9 years	0.000	0.010	0.000	-0.014	-0.001	0.004	0.004	0.006*	-0.001
2 to 4 years	0.011	0.031***	0.001	-0.010	0.039	0.004	0.013	0.011**	0.002
Controls for firm quality									
Turnover decreased	0.001	0.008**	-0.003	0.001	0.011	-0.002	0.001	0.002*	-0.004
Debt to assets ratio increased	0.011**	-0.005*	-0.004*	0.020*	-0.005	-0.004	0.003	-0.002*	-0.004
Credit history deteriorated	0.028***	0.044***	0.004*	0.040***	0.069***	0.004	0.015***	0.013***	0.004
Capital position deteriorated	0.017***	0.024***	0.005*	0.022*	0.041***	0.005	0.011***	0.006***	0.007
Deteriorated prospects	0.021***	0.009**	0.002	0.038***	0.027***	0.002	0.008**	0.000	0.000
Industry	-0.001	0.002	0.002	-0.004	0.001	0.004	0.001	0.001	0.000
Construction	0.007	0.007	0.003	0.012	0.022	0.005	0.005	0.000	0.001
Trade	-0.004	-0.003	-0.004*	-0.006	-0.007	-0.001	-0.002	-0.001	-0.008*
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	13177	16100	16100	6673	8359	8359	6504	7741	7741

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. . Country and time dummies are present in every regressions, yet are not depicted. * p < 0.1, ** p < 0:05, *** p < 0:01.p < 0:01.

Table 15: Baseline specification on external financing usage- panel probit model with random effects–marginal effects.

Trade credit	Main results			Stressed countries			Non-stressed countries		
	Rationed	Rejected	Self-rationed	Rationed	Rejected	Self-rationed	Rationed	Rejected	Self-rationed
Firm size									
<10 (Micro)	-0.019*	0.013***	0.003	-0.023*	0.011***	0.002	-0.006	0.005***	0.006
< 50 ≤10 (Small)	-0.002	0.004***	0.007*	-0.008	0.004*	0.005	0.009	0.001**	0.010
Firm age									
10 years or more	-0.008	0.002	-0.003	-0.02	0.004	-0.003	0.006	0.000	-0.006
5 to 9 years	0.009	0.006	-0.001	0.013	0.011	-0.001	-0.002	0.000	-0.004
2 to 4 years	0.019	0.008	-0.001	0.01	0.017	-0.003	0.024	0.000	0.002
Controls for firm quality									
Turnover decreased	0.004	0.003**	0.004	0.005	0.004*	0.003	0.001	0.001*	0.011
Debt to assets ratio increased	0.027***	0.002	0.000	0.030**	0.004*	-0.001	0.013	0.000	0.005
Credit history deteriorated	0.059***	0.016***	0.002	0.066***	0.020***	0.003	0.032**	0.001***	-0.003
Capital position deteriorated	0.021*	0.004**	0.003	0.023*	0.007***	0.002	0.013	0.000	0.004
Deteriorated prospects	0.021**	0.002*	-0.002	0.032**	0.004*	-0.001	0.001	0.000	-0.003
Industry	0.010	0.000	-0.002	-0.004	0.001	-0.001	0.028**	0.000	-0.005
Construction	0.015	0.004*	-0.002	0.014	0.006*	0.000	0.013	0.000	-0.003
Trade	0.001	-0.003*	-0.002	-0.002	-0.003	-0.001	0.002	-0.001	-0.004
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	9631	10898	10560	6916	7893	7893	2715	3005	2667

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. . Country and time dummies are present in every regressions, yet are not depicted. * p < 0.1, ** p < 0:05, *** p < 0:01.p < 0:01.

Table 16: Baseline specification on external financing usage- panel probit model with random effects–marginal effects.

Other external financing	Main results			Stressed countries			Non-stressed countries		
	Rationed	Rejected	Self-rationed	Rationed	Rejected	Self-rationed	Rationed	Rejected	Self-rationed
Firm size									
<10 (Micro)	-0.001	0.015***	0.002	-0.005	0.028**	0.001	-0.001	0.011**	0.004
< 50 ≤10 (Small)	-0.005	0.006*	0.001	-0.014	0.025**	0.000	-0.002	0.001	0.001
Firm age									
10 years or more	0.002	-0.001	0.002	0.036	0.008	0.000	-0.005	-0.002	0.007
5 to 9 years	0.008	0.004	0.004	0.081	0.028	0.001	-0.006	-0.002	0.011
2 to 4 years	0.015	0.005	0.004	0.032	0.026	0.002	0.011	0.001	0.008
Controls for firm quality									
Turnover decreased	-0.001	0.005*	-0.001	-0.006	0.011	-0.001	0.002	0.003	-0.004
Debt to assets ratio increased	0.002	0.001	-0.001	0.009	0.008	-0.001	-0.001	-0.001	-0.002
Credit history deteriorated	0.023***	0.02***	0.000	0.039**	0.04***	0.000	0.019*	0.016***	-0.001
Capital position deteriorated	0.015*	0.011***	0.002	0.034*	0.016	0.001	0.010	0.012**	0.008
Deteriorated prospects	0.002	0.007**	0.002	0.018	0.025**	0.002	-0.005	0.001	0.001
Industry	-0.002	0.007*	-0.001	-0.001	0.027**	0.000	-0.003	0.001	-0.003
Construction	0.008	0.005	0.002	0.015	0.025	0.001	0.004	-0.002	0.002
Trade	0.002	0.004	-0.001	-0.001	0.012	0.000	0.003	0.001	-0.003
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	6115	7010	7010	2425	2943	2943	3690	4067	4067

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. . Country and time dummies are present in every regressions, yet are not depicted. * p < 0.1, ** p < 0:05, *** p < 0:01.p < 0:01.

Table 17: Baseline specification on external financing usage- panel probit model with random effects–marginal effects.

Credit line, bank overdraft or credit cards overdraft	Main results			Stressed countries			Non-stressed countries		
	Rationed	Rejected	Self-rationed	Rationed	Rejected	Self-rationed	Rationed	Rejected	Self-rationed
Firm size									
<10 (Micro)	-0.007	0.029***	0.007***	-0.023	0.027**	0.005**	0.008	0.026***	0.008**
< 50 ≤10 (Small)	-0.006	0.011*	0.004**	-0.016	0.010	0.003*	0.003	0.010*	0.005*
Firm age									
10 years or more	0.000	-0.001	0.000	-0.019	-0.004	-0.002	0.013	0.000	0.002
5 to 9 years	0.011	0.017	-0.001	-0.006	0.017	-0.002	0.025	0.013	0.000
2 to 4 years	0.016	0.031*	0.001	-0.026	0.047	-0.001	0.046*	0.017	0.005
Controls for firm quality									
Turnover decreased	0.001	0.009*	-0.001	0.003	0.015*	0.000	-0.001	0.003	-0.001
Debt to assets ratio increased	0.031***	-0.003	-0.001	0.038***	0.003	-0.002	0.024**	-0.007*	-0.001
Credit history deteriorated	0.051***	0.043***	0.003*	0.064***	0.056***	0.002	0.038***	0.028***	0.003
Capital position deteriorated	0.030***	0.017***	0.001	0.035**	0.022**	0.002	0.023*	0.012**	0.000
Deteriorated prospects	0.014	0.003	0.000	0.005	0.005	0.001	0.024*	0.000	-0.001
Industry	0.006	0.004	0.000	0.012	0.015	-0.002	0.003	-0.002	0.004
Construction	0.006	0.012	0.001	0.026	0.026*	-0.001	-0.007	0.004	0.007*
Trade	-0.004	0.000	0.001	0.002	0.010	0.000	-0.007	-0.005	0.002
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	10811	10811	10811	5805	5805	5805	5006	5006	5006

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. . Country and time dummies are present in every regressions, yet are not depicted. * p < 0.1, ** p < 0:05, *** p < 0:01.p < 0:01.

4.4.3 The determinants of "*discouraged borrowers"*

In line with our prior expectation, the data suggests that smaller, younger firms show a greater tendency to be discouraged for bank loans (see Table 18). A firm's size apparently is a significant element when compared with its age across our various specification. Focusing on the whole sample of the EU-11, the data suggests that older firms are more equipped to dilute the problem of information asymmetry, probably a result of more successful financial relationships in line with results obtained in Mac an Bhaid *et al.* (2016). When examining variables related to the financial profile of firms, the results indicate that firms with the prospect of deteriorating credit history and capital position show a greater tendency to be discouraged at a rate of 2% and 7%, respectively. Moreover, decreasing turnover and rising debt compared to asset ratio produces increasing discouragement. Concentrating on macrocosmic factors, there is evidence to support that greater bond yields facilitates discouragement. We also find that firms in trade sector are less likely to be discouraged for bank loans.

Considering the unbalanced panel nature of the dataset[52], the scope of our analysis is augmented by also looking at firms' survival rates, considering firms with less than 3 times frequency as opposed to those with greater than 4 frequency rates. Overall, the general results deducted from this exercise are in line with the full sample of the EU-11 and demonstrate that a higher mean recovery rate under bankruptcy decreases the

[52] Analysis of various credit constraints measures as depicted in Table 4 suggest that firms in the Netherlands are experiencing a higher than expected rate of credit constraint among our different measures. Also, the rate of discouraged borrowers as shown in Table 5 are somewhat elevated in the Netherlands. It is possible that the integrity of our findings could be affected by this anomaly which warrants future studies in order to further scrutinise the issue of '*discouraged borrowers'*, especially in the case of the Eurozone. One way of dealing with this anomaly is to exclude the Netherlands from the chosen sample in order to see how regressions alter before and after this exercise. If future studies opt out to exclusively compare the core vs. periphery countries of the Eurozone, they may well relocate the Netherlands to the periphery pool due to the anomalous statistics exhibited in our study. Furthermore, particular attention has to be given to the nature of SMEs and the government policies that have transmuted into a potentially hazardous financing environment for Dutch firms to operate in.

probability of discouragement solely in firms with frequency<=3, even though marginal effects of this parameter are comparatively small. There is also slight variation within the firms' age category of 5-9 years, as our estimates point to an insignificant effect of this category for the level of discouragement in firms with frequency>=4.

Concentrating on stressed countries of the EU-11, significant proof exists to corroborate that micro firms are more likely to be discouraged; yet, there is no supporting evidence for the effects of firms' ages on the level of discouragement, unlike the trend shown for the whole sample. It can be deducted that micro firms face a higher discouragement and this is more prevalent when limiting the sample to frequency<=3, where 20% of firm are indeed likely to face discouragement. Firm-specific characteristics produce a comparable effect on discouragement in line with EU-11 whole sample with the variable corresponding to a decreasing turnover of firms as the only exception to this pattern.

As for banking and macroeconomic indicators, it is valuable to mention that higher government bonds yield produce discouragement in stressed countries, implying that financial pressure within the sector has a negative effect on firms requests for external financing via banks. However, this pattern fails to hold true for firms with frequency<=3 survival rate.

Focusing on non-stressed countries, the results suggest that micro and younger firms are relatively more prone to be discouraged for bank loans. Yet, it should be noted here that both micro and small firms face moderately lower discouragement rates relative to the stressed countries. The significant impact of firm's age can be deemed as a difference between stressed vs. non stressed countries. Unlike the trend for government bond yields in the case of stressed countries, the indicators are not linked with discouragement here. Additionally, the bank overdraft rates seem to have an unexpected positive impact on

discouragement solely in non-stressed countries; this may be explained by a fluctuation observed during the time under inspection from 2009H1-2014H2. The positive significant relationship of the change in GDP can be considered somewhat unexpected; however, when limiting the sample to frequency>=4 or survival rate, the impact of GDP on discouragement becomes less pronounced. In the context of the positive impact of private sector credit the results are supported by Holton *et al.* (2014).

Table 18: Determinants of borrower discouragement - panel probit model with random effects–marginal effects.

	Main results				Main results (Frequency<=3)				Main results (Frequency>=4)			
	Firm specific	Banking	Macroeconomic	All	Firm specific	Banking	Macroeconomic	All	Firm specific	Banking	Macroeconomic	All
Firm controls variables												
<10 (Micro)	0.183***	0.183***	0.182***	0.182***	0.178***	0.178***	0.177***	0.177***	0.177***	0.176***	0.177***	0.176***
< 50 ≤10 (Small)	0.064***	0.064***	0.063***	0.063***	0.063***	0.063***	0.061***	0.061***	0.058***	0.057***	0.058***	0.057***
10 years or more	-0.003	-0.003	-0.004	-0.003	-0.003	-0.002	-0.003	-0.002	-0.007	-0.007	-0.008	-0.009
5 to 9 years	0.032*	0.032*	0.032*	0.032*	0.035*	0.035*	0.035*	0.036*	0.017	0.018	0.016	0.016
2 to 4 years	0.078***	0.079***	0.078***	0.080***	0.076***	0.076***	0.076***	0.078***	0.082*	0.080*	0.081*	0.080*
Controls for firm quality												
Turnover decreased	0.017**	0.017**	0.018**	0.018**	0.018**	0.018**	0.018**	0.018**	0.014	0.013	0.015	0.014
Debt to assets ratio increased	-0.043***	-0.043***	-0.043***	-0.043***	-0.040***	-0.039***	-0.040***	-0.039***	-0.043***	-0.043***	-0.043***	-0.043***
Credit history deteriorated	0.018**	0.018**	0.018**	0.018**	0.016*	0.017*	0.016*	0.016*	0.020	0.019	0.020	0.020
Capital position deteriorated	0.072***	0.072***	0.071***	0.072***	0.072***	0.072***	0.072***	0.072***	0.064***	0.064***	0.063***	0.063***
Deteriorated prospects	0.018**	0.018**	0.016**	0.016**	0.014*	0.014	0.013	0.013	0.023*	0.022*	0.022*	0.022*
Banking & macro factors												
Insolvency		-0.003		-0.002		-0.005**		-0.004*		0.007*		0.008*
Bank rate		-0.001		-0.002		-0.001		-0.002*		0.000		-0.001
GDP			0.008***	0.009***			0.009***	0.009***			0.006	0.009*
10 year bond yield			0.012***	0.012***			0.014***	0.014***			0.006*	0.005
Private sector credit			0.000	0.000			0.000	0.000			0.000	0.000
Industry	-0.004	-0.004	-0.004	-0.004	-0.006	-0.006	-0.006	-0.005	0.006	0.006	0.006	0.006
Construction	0.003	0.003	0.004	0.004	-0.004	-0.004	-0.003	-0.003	0.038	0.038	0.038	0.038
Trade	-0.028***	-0.028***	-0.027***	-0.027***	-0.029***	-0.029***	-0.028***	-0.028***	-0.018	-0.018	-0.017	-0.017
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	20123	20123	20123	20123	15189	15189	15189	15189	4934	4934	4934	4934

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. Country and time dummies are present in every regressions, yet are not depicted * p < 0.1, ** p < 0:05, *** p < 0:01.

Table 19: Determinants of borrower discouragement - panel probit model with random effects–marginal effects.

	Stressed countries				Stressed countries (Frequency<=3)				Stressed countries (Frequency>=4)			
	Firm specific	Banking	Macroeconomic	All	Firm specific	Banking	Macroeconomic	All	Firm specific	Banking	Macroeconomic	All
Firm controls variables												
<10 (Micro)	0.204***	0.203***	0.204***	0.203***	0.206***	0.205***	0.206***	0.205***	0.174***	0.174***	0.174***	0.175***
< 50 ≤10 (Small)	0.074***	0.073***	0.074***	0.072***	0.078***	0.076***	0.077***	0.075***	0.055**	0.055**	0.055**	0.055**
10 years or more	-0.031	-0.031	-0.031	-0.030	-0.033	-0.033	-0.034	-0.032	-0.010	-0.009	-0.010	-0.009
5 to 9 years	-0.007	-0.007	-0.009	-0.007	-0.002	-0.002	-0.003	-0.001	-0.026	-0.025	-0.027	-0.026
2 to 4 years	0.034	0.032	0.033	0.032	0.027	0.026	0.026	0.025	0.072	0.073	0.073	0.075
Controls for firm quality												
Turnover decreased	0.013	0.014	0.013	0.013	0.011	0.012	0.011	0.011	0.014	0.013	0.014	0.013
Debt to assets ratio increased	-0.051***	-0.051***	-0.050***	-0.050***	-0.046***	-0.046***	-0.046***	-0.045***	-0.061***	-0.060***	-0.059***	-0.059***
Credit history deteriorated	0.031**	0.032***	0.031***	0.033***	0.028*	0.029**	0.028**	0.030**	0.039*	0.038*	0.039*	0.039*
Capital position deteriorated	0.060***	0.059***	0.058***	0.059***	0.053***	0.052***	0.052***	0.053***	0.079***	0.078***	0.077***	0.077***
Deteriorated prospects	0.027**	0.026**	0.025**	0.025**	0.026*	0.025*	0.023*	0.024*	0.026	0.026	0.026	0.025
Banking & macro factors												
Insolvency		-0.010***		-0.011***		-0.014***		-0.016***		0.003		0.001
Bank rate		0.000		-0.001		0.000		-0.001		-0.002		-0.003
GDP			0.006*	0.001			0.008**	0.001			0.000	0.000
10 year bond yield			0.009***	0.009***			0.010***	0.009***			0.006	0.006
Private sector credit			0.001	0.000			0.001	-0.001			0.000	0.000
Industry	-0.022*	-0.021*	-0.022*	-0.020*	-0.024*	-0.022	-0.023*	-0.022	-0.010	-0.010	-0.010	-0.010
Construction	0.004	0.003	0.003	0.003	-0.004	-0.006	-0.004	-0.005	0.037	0.036	0.037	0.037
Trade	-0.038***	-0.037***	-0.036***	-0.036***	-0.038***	-0.037***	-0.036***	-0.036**	-0.033	-0.034	-0.033	-0.033
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	10669	10669	10669	10669	8035	8035	8035	8035	2634	2634	2634	2634

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. Country and time dummies are present in every regressions, yet are not depicted * p < 0.1, ** p < 0:05, *** p < 0:01.

Table 20: Determinants of borrower discouragement - panel probit model with random effects–marginal effects.

	Non-stressed countries				Non-stressed countries (Frequency<=3)				Non-stressed countries (Frequency>=4)			
	Firm specific	Banking	Macroeconomic	All	Firm specific	Banking	Macroeconomic	All	Firm specific	Banking	Macroeconomic	All
Firm controls variables												
<10 (Micro)	0.155***	0.157***	0.153***	0.153***	0.143***	0.144***	0.143***	0.143***	0.170***	0.171***	0.165***	0.166***
< 50 ≤10 (Small)	0.050***	0.049***	0.048***	0.048***	0.045***	0.046***	0.045***	0.045***	0.049**	0.047**	0.047**	0.046**
10 years or more	0.006	0.009	-0.001	-0.001	0.007	0.011	0.002	0.003	-0.004	-0.002	-0.014	-0.012
5 to 9 years	0.063***	0.069***	0.055**	0.056**	0.059**	0.066***	0.054**	0.054**	0.063	0.067	0.051	0.053
2 to 4 years	0.104***	0.112***	0.094***	0.095***	0.108***	0.116***	0.102***	0.101***	0.077*	0.076*	0.065	0.063
Controls for firm quality												
Turnover decreased	0.019*	0.020**	0.019*	0.019*	0.022**	0.022**	0.021*	0.021*	0.010	0.009	0.011	0.010
Debt to assets ratio increased	-0.034***	-0.034***	-0.033***	-0.033***	-0.031***	-0.031***	-0.031***	-0.030***	-0.028*	-0.027*	-0.029**	-0.028**
Credit history deteriorated	0.001	0.002	0.000	0.001	0.002	0.002	0.002	0.002	-0.001	0.000	-0.003	-0.002
Capital position deteriorated	0.085***	0.086***	0.085***	0.085***	0.089***	0.090***	0.090***	0.090***	0.054**	0.054**	0.054**	0.054**
Deteriorated prospects	0.008	0.009	0.007	0.007	0.003	0.004	0.002	0.002	0.018	0.018	0.017	0.016
Banking & macro factors												
Insolvency		0.003		0.000		0.001		-0.002		0.008*		0.008
Bank rate		0.056***		0.067**		0.050**		0.053*		0.079*		0.102*
GDP			0.027***	0.018***			0.024***	0.018**			0.023*	0.011
10 year bond yield			-0.008	0.014			-0.020	0.000			0.033	0.054
Private sector credit			0.008***	0.009***			0.007***	0.008***			0.007*	0.008*
Industry	0.011	0.012	0.012	0.013	0.008	0.009	0.008	0.009	0.021	0.022	0.023	0.024
Construction	0.007	0.008	0.006	0.007	0.000	0.001	0.000	0.000	0.042	0.042	0.040	0.041
Trade	-0.018*	-0.018*	-0.018*	-0.017*	-0.020*	-0.019*	-0.020*	-0.019*	-0.006	-0.005	-0.004	-0.003
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	9454	9454	9454	9454	7154	7154	7154	7154	2300	2300	2300	2300

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. Country and time dummies are present in every regressions, yet are not depicted * p < 0.1, ** p < 0:05, *** p < 0:01.

4.4.4 Extensions and robustness tests

The ultimate test of robustness entails assessing the influence of additional variables on borrower discouragement in the EU-11. As shown in Table 21, the results generally support the previous findings most specifically in the case of firm-specific characteristics. The association between credit lines, bank overdrafts or credit card overdrafts, and bank loans is supported by the concept that a good quality borrower can indicate creditworthiness by demonstrating validation from other creditors. In contrast firms which cannot indicate this show a higher tendency to be discouraged. Our findings suggest that firms that use the aforementioned source of external financing are approximately 6% less likely to be discouraged for bank loans, the findings in this present study are comparable with prior investigations that obtained results supporting an inverse relationship between credit cards usage and discouragement in the US (Han *et al*., 2009). Additionally, there is evidence to suggest that family or entrepreneurs are not as likely to be discouraged for bank loans; this finding is in line with Freel *et al.* (2012) where the study determine that in family firms, more financial dependency brings low levels of discouragement. This advantage could be a result of the extensive track records in business usually associated with family firms and their capacity to have established relationships with banks in the long term.

Moreover, contrary to the conclusions in Mac an Bhaid *et al.* (2016), there is no evidence to substantiate an inverse link between bank loans needs and discouragement. However, businesses considering access to finance as the most significant issue demonstrate a greater tendency to be discouraged at rate of 4.9%. Similar corroborating data concerning a firm's deteriorating opinion of the willingness of banks to provide loans/ willingness of partners to provide trade credit and willingness of investors to invest and discouragement are determined.

Focusing on regulatory variables, improvements in the degree of government effectiveness, regulatory quality, rule of law and control of corruption are anticipated to be positively correlated with borrower discouragement. Yet, our analysis suggests conflicting evidence when addressing these linkages. Theoretically, a more developed regulatory framework should discourage moral hazard, and therefore deter *'bad'* borrowers. Increased discouragement of '*bad*' borrowers could lead to less adverse selection. In contrast this should mean a more effective transmission of funds and reduced interest rates for '*good'* borrowers. Our mixed findings[53] can be explained by relatively weak performance in stressed countries of the EU-11 in terms of our various regulatory indicators and as a result the negative unexpected sign is driven by the previously mentioned economies.[54] Lastly, our measure of competition in the banking sector has a negative effect, showing that more concentration in the banking industry decreases the chances of discouragement. Our results indicate that 23% reduction in the possibility of businesses being discouraged from applying for bank loans. The data upholds the previous seminal results obtained by Han *et al.* (2009). The researchers conclude that discouragement is an effective self-rationing mechanism. Furthermore, low risk borrowers are deemed less prone to be "*discouraged in concentrated markets than in competitive markets"*, and also that, in the background of concentrated markets, high risk borrowers are more prone to be discouraged in more protracted financial relationships.

[53] We think the reason behind the statistical negative relationship is due to the level heterogeneity presented especially in the euro area stressed countries relative to the core economies of the Eurozone as shown in the Appendix E. Accordingly, future studies ought to consider this anomaly in greater detail in order to ascertain whether regrouping the sample into two sub-samples of core vs. periphery stressed countries would indeed generate a different statistical relationship when addressing the aforementioned two groups of countries.

[54] Appendix E reports the regulatory variables for EU-11 countries.

Table 21: Determinants of borrower discouragement - panel probit model with random effects–marginal effects (Robustness check).

	Firm specific	Regulatory	Banking & macroeconomic	Omnibus
Firm controls variables				
<10 (Micro)	0.170***	0.168***	0.180***	0.178***
< 50 ≤10 (Small)	0.055***	0.054***	0.051**	0.050**
10 years or more	-0.028	-0.027	-0.035	-0.035
5 to 9 years	-0.007	-0.004	-0.003	-0.001
2 to 4 years	0.031	0.034	0.044	0.046
Controls for firm quality				
Turnover decreased	0.028***	0.029***	0.026	0.027
Debt to assets ratio increased	-0.033***	-0.033***	-0.024	-0.024
Credit history deteriorated	-0.004	-0.004	-0.015	-0.015
Capital position deteriorated	0.053***	0.054***	0.061***	0.061***
Deteriorated prospects	-0.001	-0.002	-0.006	-0.005
Deteriorated general economic outlook	-0.001	0.000	0.011	0.009
Deterioration on willingness of banks to provide loans	0.066***	0.064***	0.085***	0.085***
Deterioration on willingness of partners to provide trade credit	0.020*	0.018*	0.026	0.024
Deterioration on willingness of investors to invest	0.063***	0.065***	0.082**	0.085**
Needs for bank loans increased	0.007	0.007	0.014	0.014
Access to finance	0.049***	0.050***	0.052***	0.053***
Credit line/credit cards overdraft usage	-0.054***	-0.055***	-0.041**	-0.042**
Interest expenses increased	-0.038***	-0.039***	-0.057***	-0.058***
Ownership factors				
Family or entrepreneurs	-0.047*	-0.047*	-0.105*	-0.105*
Other enterprises or business associates	-0.029	-0.027	-0.059	-0.060
VC or business Angels	-0.035	-0.034	-0.079	-0.079
Sole Trader	-0.024	-0.023	-0.062	-0.062
Other	-0.014	-0.012	-0.059	-0.037
Regulatory factors				
Government effectiveness		0.021		0.152
Regulatory quality		-0.251**		-0.468
Rule of law		-0.569*		-0.165
Control of corruption		-0.209**		0.025

Banking & macro factors				
Insolvency			0.026	-0.025
Bank rate			-0.108	-0.061
GDP			-0.062	-0.041
10 year bond yield			0.029*	0.018
Private sector credit			-0.012	-0.008
Lerner index			-0.223*	-0.089
Sectoral variables				
Industry	0.004	0.004	0.027	0.026
Construction	0.019	0.019	0.053*	0.053*
Trade	-0.014	-0.013	0.010	0.01
Time dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	10688	10688	3503	3503

Notes: Standard errors are robust to heteroscedasticity and clustered at the country-wave level. Country and time dummies are present in every regression, yet are not depicted * p < 0.1, ** p < 0:05, *** p < 0:01.

4.5 Conclusion

The impact of the credit crunch on the supply of credit to SMEs, and the possible subsequent impact of this on investment practices of such firms, remains a topic of substantial policy importance for the Eurozone Member States. In this chapter, we evaluate the financing structure of bank lending constrained SMEs in the euro area through determining whether these firms demonstrate comparably greater usage or requests for alternative financing. Moreover, a comprehensive examination is offered through revealing the impact and determinants of different financing constraints including credit lines, bank loans, trade credit and other lending on euro area firms. Additionally, we examine the notion of discouraged borrowers originally structured by Kon and Storey (2003).

Using survey data from 2009 to 2014, we find that credit-constrained, rationed, rejected and discouraged firms have a greater tendency to utilise informal lending. Another result characterised younger SMEs as showing a higher tendency to use informal lending; this conclusion is also valid for grants or subsidised bank loans. We do not find any substitution connection between measures of bank lending constraints and usage of trade credit. This outcome is robust in both stressed and non-stressed countries of the Eurozone. In contrast to previous predictions, we find an inverse significant relationship between our constraints measures and the request for grant financing. We find that firms who experience rejected credit applications are 6% less likely to use grants financing. Stressed Eurozone countries are on average less likely to use grant financing. These thought-provoking results could imply that the contemporary schemes of policy measures accessible by the SMEs at the euro area level are insufficiently aimed at firms confronting issues in securing credit via traditional bank lending.

We do not find any substitution connection between our broad measures of bank lending constrained with usage of leasing, hire purchase or factoring and internal funds. Focusing on periphery countries of the Eurozone, we find that firms who experience rejected credit applications are on average less likely to use this market financing as well as leasing, hire purchase or factoring, relative to the Eurozone *'core'* nations.

Our results indicate that micro and younger firms are relatively more prone to having applications for bank loans and credit line rejected; this result corroborates the majority of previous seminal studies focusing on SMEs access to finance. Similar corroborating evidence regarding firm's size and trade credit rejection are identified; however, there is no supporting evidence to determine a linkage between firm's age and our constrained indicators for trade credit and other financing. It is observed that that firms in Spain, Greece, Italy, the Netherlands and Portugal application for bank loans are more likely to be rejected; this result to a great extent also holds true for trade credit, credit lines and other external financing.

It is determined that micro and younger firms are relatively more likely to be discouraged than rejected for bank loans. Focusing on stressed countries of the Eurozone, there is substantial evidence to support the idea that micro firms are more likely to be discouraged; yet, there is no supporting data for the effects of firms' ages on the level of discouragement, unlike the trend demonstrated for the main sample in addition to non-stressed countries of euro area.

It can be garnered from our empirical findings that future public policies would be better directed at accumulating credit accessibility for enterprises operating in the euro area. It is of integral importance to draw emphasis to the essential needs of SMEs, which are often referred to as the driving force of the European economy. Having a varied mixture of types of financing available to SMEs, in addition to differentiating lending practices

within each countries financial framework, should be realised. Strong capital markets could increase the flexibility of enterprises financing needs which would let them bypass the traditional bank lending channel of monetary transmission mechanism. This will be of vital significance specifically through financial turmoil where banks have dramatically tapered off their supply of lending irrespective of monetary policy stance. In order to reduce borrower discouragement Eurozone countries need to develop their regulatory framework, this is especially prevalent in the case of the stressed countries of the Eurozone as this would discourage the issue of moral hazard and act as a deterrent for bad borrowers.

Data used in this chapter is specific for 2009 onwards and not data regarding associations present during the *'normal'* economic cycle. Accordingly, it is not possible to evaluate the existence of appreciable modifications, fuelled by factors associated with the crisis, concerning how firm-specific traits influence SMEs' financing pattern. Notably, the majority of data sampled in the ECB/EC SAFE survey is qualitative; as a result, this present investigation argues that subsequent surveys should contain both firm level balance sheet data and quantitative information regarding SMEs' financial condition. This modification would significantly benefit future studies with respect to the implications of policy and its effect on SMEs' external financing.

Appendices to Chapter 4

Appendix A

Table A1. Synopsis of empirical studies based in the Eurozone

Study	Descriptions	Main Conclusion	Comment
Kremp & Sevestre (2013)	French SMEs FIBEN database 60,000 firms 2000-2010	The primary deduction is that in spite of more prudent lending activity from banks, the impact of credit rationing on SMEs has not been significant during the post-crisis period. Most of the documented reduction in loans outstanding can be accounted for through reduced firm demand for credit, which is a result of their market decline in investment deals and business ventures.	This outcome contradicts the general belief that SMEs were significantly negatively impacted via severe credit limitations during the course of the crisis.
Holton *et al.* (2013)	SAFE data 11 euro area countries 2011H1-2013H1 Probit regressions 3 steps approach	The study argues that smaller firms and firms with relatively low turnover have a greater chance of getting loan applications rejected. Furthermore, firms which have improved their internal funds, credit history or capital positions report negative credit conditions less frequently. The results suggest that banks constrict credit conditions during periods of downturn for the real economy as well as in an environment of increased private sector debt.	Primary focus: Loan rejection. Credit perceptions. Interest rate experience.
Öztürk and Mrkaic (2014)	SAFE data 11 euro area countries 8 waves since 2009H1 Ordered logit model	The study concludes that there is a negative correlation between bank funding costs and firms' access to finance, solely within stressed nations. Specifically, greater borrowers' debt-to-asset ratios and bank financing costs are adversely and significantly correlated with SMEs' access to financing.	Primary focus: Bank loan, demand for loans, perception of loans and leverage. Limitations: Fixed-effects were not employed in the study.
Casey and O'Toole (2014)	SAFE data 11 euro area countries 5 waves since 2009H1 Panel probit model	They demonstrate that credit rationed firms that are relatively older and bigger are more inclined to utilise and request trade credit. Furthermore, the study determines that constrained firms are more inclined to employ informal lending or loans from other companies.	Primary focus: Alternative source of finance Trade credit, informal lending, market financing, grants.

Holton *et al.* (2014)	SAFE data 11 euro area countries 6 waves since 2009H1	Results demonstrate that larger and older firms are least likely to experience rejected loan requests. Moreover, private sector indebtedness has a significant impact on SMEs' credit access as well as the terms and conditions set in each deal.	Primary focus: Loan rejection Perceived deterioration ↓Demand ↑Interest rate ↑Loan size Supply vs Demand
Lawless *et al.* (2015a)	SAFE data 16 euro area countries 7 waves from 2010H1 Poisson regression Multinomial logit Regression	Firms in each country examined employ two or three finance sources to fund their firms' processes. Additionally, trade credit and informal sources of capital are practically ubiquitous in the nations sampled, with firms from Ireland reported as especially inclined to utilise them as sources of funding.	Primary focus: Alternative source of finance SAFE: Qs4.
Lawless *et al.* (2015b)	Irish government's Department of Finance SMEs data 2013-2014	The study determines that increased debt burdens exert detrimental influences on every parameter of firm performance; this is especially seen in employment, investment and other measures of financial problems. The impact is most pronounced in sectors and enterprises that are heavily dependent on national demand, which was greatly diminished post-crisis; this influence is also greatest in enterprises in the "*mid-lifecycle" and "gearing phase*" pre-crisis. The most recently established enterprises, founded post-crisis, as well as the oldest enterprises, are not influenced.	Analysing the effects of debt overhang utilising the debt-to-turnover ratio.

Appendix B

Table B1: Dependent variables

Variables	Description
(1) Trade credit	=1, if firm utilised trade credit over the past six months, =0 otherwise.
(2) Grants or subsidies bank loans	=1, if firm received grants or subsidies bank loans over the past six months, =0 otherwise.
(3) Other loans (from a related company or shareholders)	=1, if firm utilised other loans from a related company or shareholders over the past six months, =0 otherwise.
(4) Market financing	=1, if firm utilised equity, issued debt securities or subordinated loans over the past six months, =0 otherwise.
(5) Internal funds	=1, if firm utilised internal funds over the past six months, =0 otherwise.
(6) Leasing or hire purchase or factoring	=1, if firm utilised leasing/ hire purchase/factoring over the past six months, =0 otherwise.

Source: SAFE survey, Question.4

Table B2: Dependent variables

Variables	Coding	Source
Bank loans constraints dummy	Binary variable: 0 = Received everything (1). 0 = Received 75% and above (5). 1 = Received below 75% (received a limited part of it) (6). 1 = Refused because the cost was too high (3). 1 = Was rejected (4).	If you applied and tried to negotiate for this type of financing over the past 6 months, what was the outcome? 1. Received everything. 5. Received (between 75% and 99%).[55] 6. Received (between 1% and 74%). 3. Refused (the cost was too high). 4. Rejected. 2. Received only part of it.[56]
Trade credit constraints dummy	Binary variable: 0 = Received everything (1). 0 = Received 75% and above (5). 1 = Received below 75% (received a limited part of it) (6). 1 = Refused because the cost was too high (3). 1 = Was rejected (4).	If you applied and tried to negotiate for this type of financing over the past 6 months, what was the outcome? 1. Received everything. 5. Received (between 75% and 99%). 6. Received (between 1% and 74%). 3. Refused (the cost was too high). 4. Rejected. 2. Received only part of it.
Other external financing constraints dummy[57]	Binary variable: 0 = Received everything (1). 0 = Received 75% and above (5). 1 = Received below 75% (received a limited part of it) (6). 1 = Refused because the cost was too high (3). 1 = Was rejected (4).	If you applied and tried to negotiate for this type of financing over the past 6 months, what was the outcome? 1. Received everything. 5. Received (between 75% and 99%). 6. Received (between 1% and 74%). 3. Refused (the cost was too high). 4. Rejected. 2. Received only part of it.
Credit line, bank overdraft or credit cards overdraft constraints dummy	Binary variable: 0 = Received everything (1). 0 = Received 75% and above (5). 1 = Received below 75% (received a limited part of it) (6). 1 = Refused because the cost was too high (3). 1 = Was rejected (4).	If you applied and tried to negotiate for this type of financing over the past 6 months, what was the outcome? 1. Received everything. 5. Received (between 75% and 99%). 6. Received (between 1% and 74%). 3. Refused (the cost was too high). 4. Rejected.

Source: SAFE survey Question. 7B

[55] Notes: Refers to results including and after the third wave of surveys.
[56] Notes: Refers to results concerning the initial two waves of surveys.
[57] It can be supplied from the subsequently outlined resources: loans from a related company, shareholders or family and friends, leasing, factoring, grants, subordinated debt instruments, participating loans, peer to-peer lending, crowdfunding, and issuance of equity and debt securities.

Table B3: Explanatory variables

Variables	Coding	Source
Firm size	Categorical variable: 1. <10 (Micro). 2. < 50 ≤10 (Small). 3. < 250 ≤ 50 (Medium-sized). 4. ≤250 (Large).	How many persons does your company currently employ in full time or part time in **[**YOUR COUNTRY] at all locations?
Firm age	Categorical variable: 1. 10 years or more. 2. 5 years or more, but less than 10 years. 3. 2 years or more, but less than 5 years. 4. Less than 2 years.	In which year was your firm registered?
Net interest expenses ↑	Binary variable 1 = Increased. 0 = Remained unchanged. 0 = Decreased.	Please tell me whether your net interest expenses: 1. Increased. 2. Decreased. 3. Remained unchanged.
Profit ↓	Binary variable 0 = Increased. 0 = Remained unchanged. 1 = Decreased.	Please tell me whether your profit: 1. Increased. 2. Decreased. 3. Remained unchanged.
Turnover ↓	Binary variable 0 = Increased. 0 = Remained unchanged. 1 = Decreased.	Please tell me whether your turnover: 1. Increased. 2. Decreased. 3. Remained unchanged.
Debt compared to assets ↑	Binary variable 1 = Increased. 0 = Remained unchanged. 0 = Decreased.	Please tell me whether your debt to total assets: 1. Increased. 2. Decreased. 3. Remained unchanged.
General economic outlook	Binary variable 0 = Improved. (1), remained unchanged (2). 1 = Deteriorated (3).	For your firm-specific situation and to lenders' attitudes concerning the general economic outlook to the degree that it influences the availability of external financing would you say that over the past 6 months they have: 6 months they have: 1. Improved. 2. Remained unchanged. 3. Deteriorated.
Access to public financial support, including guarantees	Binary variable 0 = Improved. (1), remained unchanged (2). 1 = Deteriorated (3).	With respect to your access to public financial support insofar as it affects the availability of external financing would you say that over the past 6 months they have: 1. Improved. 2. Remained unchanged. 3. Deteriorated.
Prospects (outlook with respect to your sales and profitability or business plan)	Binary variable Improved prospects: 0 = Improved. (1), remained unchanged (2) 1 = Deteriorated (3).	With respect to your sales and profitability or business plan insofar as it affects the availability of external financing would you say that over the past 6 months they have: 1. Improved. 2. Remained unchanged. 3. Deteriorated.
Firm's own capital	Binary variable 0 = Improved. (1), remained unchanged (2). 1 = Deteriorated (3).	With respect to your firm's own capital as it affects the availability of external financing would you say that over the past 6 months they have: 1. Improved. 2. Remained unchanged. 3. Deteriorated.

Firm's credit history	Binary variable 0 = Improved. (1), remained unchanged (2). 1= Deteriorated (3).	With respect to your firm's credit history as it affects the availability of external financing would you say that over the past 6 months they have: 1. Improved. 2. Remained unchanged. 3. Deteriorated.

Source: SAFE survey

Appendix C

Table C1: Breakdown of firms

	Frequency	Percent	Cumulative frequency
Firm age			
10 years or more	41,337	78.45	78.45
5-9 years	6,382	12.11	90.56
2-4 years	2,927	5.56	96.12
Less than 2 years	664	1.26	97.38
DK/NA	1,381	2.62	100
Firm size			
Micro	16,784	31.85	31.85
Small	17,830	33.84	65.69
Medium	13,901	26.38	92.07
Large	4,176	7.93	100
Sector			
Industry	13,281	25.21	25.21
Construction	5,113	9.70	34.91
Trade	13,427	25.48	60.39
Services	16,694	31.68	92.07
DK/NA	4,176	7.93	100
Ownership			
Public shareholders	1,909	3.68	3.68
Family or entrepreneurs	28,498	54.99	58.67
Other firms or business associates	6,240	12.04	70.72
Venture capital firms or business angel	540	1.04	71.76
A natural person, one owner only	12,962	25.01	96.77
Other	1,147	2.21	98.98
DK/NA	527	1.02	100

Source: author's own estimations utilising ECB SAFE data

Appendix D

In keeping with the novel industrial organisation (IO) method, the market power is measured via Lerner index which confers the added benefit inherent in a separate, dynamic gauge of market power (Brämer et al., 2013). Marginal cost is calculated based on a translog cost function with one output (total assets) as well as the subsequently listed three input prices: price of labour, price of capital and price of funds. A cost function utilising panel data of bank fixed effects is calculated, incorporating time dummy variables to control for heterogeneity in the available sample.
Linear homogeneity restrictions are applied to input prices as suggested in Weil (2013) and Fungáčová, et al. (2014). This is done by normalising total costs as well as input prices via one input price. Accordingly, the cost function has the following designation:

The Lerner index gauges the banks' capacity to increase prices in excess of marginal costs; this index with greater units therefore suggests greater market power and reduced competitive market conditions. Moreover, the Lerner index is determined as the proportion of the remainder between price of output and marginal cost to the price, the latter of which is calculated utilising the proportion of total revenues to total assets. Marginal cost is calculated based on a translog cost function with one output (total assets) as well as the subsequently listed three input prices: price of labour, price of capital and price of funds.

A cost function utilising panel data of bank fixed effects is calculated, incorporating time dummy variables to control for heterogeneity in the available sample. Linear homogeneity restrictions are applied to input prices as suggested in Weil (2013) and Fungáčová *et al.* (2014). This is done by normalising total costs as well as input prices via one input price. Accordingly, the cost function has the following designation:

$$\ln\left(\frac{TC}{W3}\right) = \alpha_0 + \alpha_1 \ln y + \frac{\alpha 2}{2}(\ln y)^2 + \alpha_3 \ln\left(\frac{W1}{W3}\right) + \alpha_4 \ln\left(\frac{W2}{W3}\right) + \alpha_5 \ln\left(\frac{W1}{W3}\right)\ln\left(\frac{W2}{W3}\right) + \frac{\alpha 6}{2}\left(\ln\left(\frac{W1}{W3}\right)^2 + \frac{\alpha 7}{2}\left(\ln\left(\frac{W2}{W3}\right)^2 + \alpha_8 \ln y \ln\left(\frac{W1}{W3}\right) + \alpha_9 \ln y \ln\left(\frac{W2}{W3}\right) + \varepsilon \right. \quad \textbf{(1)}$$

where TC represents the total cost which is calculated as the total of personnel expenses, other non-interest expenses and interest paid. Y denotes total assets, w_1 denotes the price of labour estimated as a proportion personnel expenses to total assets, w_2 symbolises the price of physical capital and is estimated as a proportion of non-interest expenses to fixed assets. Finally, w_3 denotes the price of borrowed funds, defined as the ratio of interest expenses to deposits and short-term funding. The measured coefficients of the cost function from the preceding cost function are subsequently utilised to calculate the marginal cost (MC):

$$MC = \frac{TC}{y}\left(\alpha_1 + \alpha_2 \ln y + \alpha_8 \ln\left(\frac{W1}{W3}\right) + \alpha_9 \ln\left(\frac{W2}{W3}\right)\right) \quad \textbf{(2)}$$

After marginal cost and the price of output are estimated, this facilitates the calculation of the Lerner index specific to every bank sampled and consequently a complete estimation of bank competition.

Appendix E

1. Government Effectiveness:

		2008	2009	2010	2011	2012	2013	2014
Country/Territory								
AUSTRIA	AUT	1.77	1.67	1.84	1.61	1.56	1.57	1.57
BELGIUM	BEL	1.38	1.59	1.58	1.66	1.59	1.59	1.40
FINLAND	FIN	2.04	2.24	2.25	2.26	2.21	2.17	2.02
FRANCE	FRA	1.58	1.49	1.45	1.37	1.33	1.47	1.40
GERMANY	DEU	1.52	1.59	1.57	1.55	1.57	1.52	1.73
GREECE	GRC	0.59	0.61	0.55	0.50	0.31	0.45	0.40
IRELAND	IRL	1.49	1.34	1.34	1.45	1.53	1.46	1.60
ITALY	ITA	0.29	0.42	0.45	0.38	0.41	0.45	0.38
NETHERLANDS	NLD	1.69	1.74	1.73	1.79	1.80	1.77	1.83
PORTUGAL	PRT	1.08	1.16	1.02	0.96	1.03	1.23	1.01
SPAIN	ESP	0.92	0.93	0.99	1.03	1.11	1.15	1.15

2. Regulatory Quality:

		2008	2009	2010	2011	2012	2013	2014
Country/Territory								
AUSTRIA	AUT	1.60	1.46	1.46	1.39	1.51	1.48	1.49
BELGIUM	BEL	1.39	1.32	1.29	1.24	1.22	1.29	1.17
FINLAND	FIN	1.62	1.83	1.89	1.83	1.82	1.85	1.90
FRANCE	FRA	1.28	1.21	1.31	1.15	1.12	1.15	1.09
GERMANY	DEU	1.49	1.52	1.58	1.55	1.53	1.55	1.70
GREECE	GRC	0.87	0.81	0.63	0.49	0.50	0.61	0.34
IRELAND	IRL	1.92	1.70	1.61	1.59	1.56	1.57	1.75
ITALY	ITA	0.95	0.94	0.89	0.71	0.73	0.77	0.66
NETHERLANDS	NLD	1.77	1.71	1.74	1.81	1.75	1.76	1.78
PORTUGAL	PRT	1.10	0.98	0.73	0.63	0.81	0.78	0.77
SPAIN	ESP	1.24	1.17	1.15	1.06	0.95	0.93	0.78

3. Rule of Law:

		2008	2009	2010	2011	2012	2013	2014
Country/Territory								
AUSTRIA	AUT	1.93	1.79	1.81	1.81	1.84	1.83	1.96
BELGIUM	BEL	1.33	1.36	1.37	1.40	1.40	1.40	1.51
FINLAND	FIN	1.90	1.97	1.98	1.96	1.94	1.93	2.12
FRANCE	FRA	1.48	1.43	1.51	1.44	1.43	1.40	1.47
GERMANY	DEU	1.72	1.64	1.62	1.61	1.64	1.62	1.85
GREECE	GRC	0.84	0.16	0.16	0.16	0.15	0.15	0.15
IRELAND	IRL	1.69	0.16	0.16	0.16	0.15	0.16	0.16
ITALY	ITA	0.42	0.16	0.16	0.16	0.14	0.15	0.15
NETHERLANDS	NLD	1.75	0.17	0.16	0.16	0.14	0.15	0.15
PORTUGAL	PRT	0.99	1.05	1.04	1.03	1.05	1.04	1.13

4. Control of Corruption:

		2008	2009	2010	2011	2012	2013	2014
Country/Territory								
AUSTRIA	AUT	1.92	1.76	1.63	1.44	1.35	1.51	1.44
BELGIUM	BEL	1.32	1.43	1.49	1.56	1.55	1.63	1.55
FINLAND	FIN	2.41	2.30	2.18	2.22	2.22	2.19	2.18
FRANCE	FRA	1.38	1.42	1.44	1.52	1.42	1.30	1.27
GERMANY	DEU	1.73	1.72	1.74	1.71	1.78	1.78	1.83
GREECE	GRC	0.10	0.01	-0.16	-0.18	-0.25	-0.11	-0.20
IRELAND	IRL	1.76	1.77	1.70	1.54	1.45	1.54	1.62
ITALY	ITA	0.25	0.13	0.00	0.08	-0.03	-0.04	-0.11
NETHERLANDS	NLD	2.16	2.17	2.18	2.16	2.13	2.05	2.00
PORTUGAL	PRT	1.00	1.04	1.03	1.08	0.93	0.91	0.88
SPAIN	ESP	1.11	1.00	1.01	1.05	1.05	0.81	0.53

Appendix F

European Commission and European Central Bank Survey on the access to finance of enterprises, October 2014 to March 2015

[INTRODUCTION TO THE ONLINE SURVEY]

Welcome to the Survey on the access to finance of enterprises: a joint initiative of the European Commission and the European Central Bank.

Your business has been selected to participate in this Europe-wide survey, which aims to assess the financing needs and the availability of financing among companies like yours. We very much appreciate your participation.

Your answers to this voluntary survey will be treated in strict confidence, used for statistical purposes and published in aggregate form only.

Please click 'next' to continue.

[INTRODUCTION TO THE TELEPHONE SURVEY][1]

Hello, my name is <*interviewer*> and I am calling from <*survey company*> on behalf of the European Commission and the European Central Bank. Your business has been selected to participate in a Europe-wide survey on the financing needs and the availability of financing among companies like yours.

European policy-makers want to have a better understanding of the issues and circumstances faced by small, medium-sized and large non-financial enterprises when it comes to accessing finance from banks and other institutions. This survey is now being conducted across Europe and your input is of the utmost importance: the responses to the survey will help shape policy decisions by the European Commission and the European Central Bank.

[IF RESPONDENT IS FROM PANEL: You may remember that we spoke to you about <*INSERT CORRECT TIME PERIOD (e.g. six months, one year, one and a half years)*> ago and you kindly said that you would be willing to participate again in the survey at around this time.]

---

[1] Used formatting:

- TEXT IN CAPITAL LETTERS refers to the instructions and should never be read;
- <*text in brackets and italics*> refers to the parameters – the dynamic text which should be adapted based on the respondent's information.

[READ IF NECESSARY (IF RESPONDENTS ASK FOR MORE INFORMATION ABOUT THE PROJECT): The results of the survey will help the European Commission in its evidence-based policy-making to improve the access to finance for businesses and in the monetary policy of the European Central Bank. Can I e-mail you some more information about the survey?]
May I speak with the most appropriate person – the person best able to provide information on how your company is financed?
[READ IF NECESSARY: This person could be the owner, a finance manager, the finance director or the chief financial officer (CFO).]

Your answers to this voluntary survey will be treated in strict confidence, used for statistical purposes and published in aggregate form only.

[READ IF NECESSARY: Would you prefer to participate in the survey by phone or online?]

SECTION 1: GENERAL CHARACTERISTICS OF THE ENTERPRISE (*DEMOGRAPHIC PART, COMMON*)

[FOR PANEL MEMBERS:] **First a few demographic questions – you may have already answered these, but it would be good to confirm that the details are still correct.**

D2. NEW RESPONDENTS: How would you characterise your enterprise? Is it...
D2. PANEL MEMBERS: Can you confirm that your enterprise is <*STATE ANSWER FROM PREVIOUS WAVE*>? [READ IF NECESSARY: **If not, what is the correct category?]**

[ONLY ONE ANSWER IS POSSIBLE]

- a subsidiary of another enterprise [READ IF NECESSARY: a separate, distinct legal entity that is part of a profit-oriented enterprise] 4
- a branch of another enterprise [READ IF NECESSARY: branches are controlled by a parent company and are not separate legal entities] 5
- an autonomous profit-oriented enterprise, making independent **financial** decisions [READ IF NECESSARY: in the sense of making independent management decisions; this includes partnerships and cooperatives] 2
- a non-profit enterprise [READ IF NECESSARY: foundation, association, semi-government] 3
- [DK/NA] 9

[IF 3 (NON-PROFIT) → STOP INTERVIEW → INTERVIEW NOT VALID]

[IF 4 (SUBSIDIARY) → MAKE THE FOLLOWING REQUEST]
In your replies to all the following questions, please respond on behalf of the subsidiary.

[IF 5 (BRANCH) → ASK THE FOLLOWING QUESTION]
Are you knowledgeable about the finances of the whole enterprise, that is, the head office and all branches?

[IF NO → STOP INTERVIEW → INTERVIEW NOT VALID]
[IF YES: **Please respond on behalf of the whole enterprise, that is, the head office and all branches.]**

[FILTER: IF D2 FEATURES 4 OR 5]
D2A. NEW RESPONDENTS: In which country is the parent company of your enterprise located?
D2A. PANEL MEMBERS: Can you confirm that the parent company of your enterprise is located in <*STATE ANSWER FROM PREVIOUS WAVE*>? [READ IF NECESSARY: **If not, what is the correct country?]**
[DO NOT READ OUT – USE ISO COUNTRY CODES]

[LIST OF MAIN COUNTRY CODES]

EURO AREA COUNTRIES

AT Austria
BE Belgium
CY Cyprus
EE Estonia
FI Finland
FR France
DE Germany
GR Greece
IE Ireland
IT Italy
LT Lithuania
LV Latvia
LU Luxembourg
MT Malta
NL Netherlands
PT Portugal
SK Slovakia
SI Slovenia
ES Spain

OTHER EU MEMBER STATES

BG Bulgaria
HR Croatia
CZ Czech Republic
DK Denmark
HU Hungary
PL Poland
RO Romania
SE Sweden
UK United Kingdom

OTHER COUNTRIES

CN China
IS Iceland
JP Japan
ME Montenegro

NO Norway

RU Russian Federation
CH Switzerland
US United States

-99 Don't know

[FILTER: ALL ENTERPRISES]

D1. How many people does your enterprise currently employ either full or part-time at all its locations in <*your country*>? Please do not include unpaid family workers and freelancers working regularly for your enterprise.

[READ IF NECESSARY: Full-time and part-time employees should each count as one employee. Employees working less than 12 hours per week are to be excluded.]

[ONLY ONE ANSWER IS POSSIBLE]

NUMERICAL ANSWER [1-999999]
[DK/NA]

[READ IF 1 EMPLOYEE: The business must have at least one employee beyond the owner(s). Can you confirm that the employee is not the owner?]

[IF 0 EMPLOYEES → STOP INTERVIEW → INTERVIEW NOT VALID]

D1_rec. [IF NA/DK → ASK ABOUT APPROXIMATE NUMBER IN BRACKETS – ONLY ONE ANSWER IS POSSIBLE → IF STILL NA/DK → STOP INTERVIEW → INTERVIEW NOT VALID]
What is the approximate number?

- from 1 employee to 9 employees 1
- from 10 employees to 49 employees 2
- from 50 employees to 249 employees 3
- 250 employees or more 4
- [DK/NA] 9

D1_C. PANEL MEMBERS: [IF THE NEW CATEGORY DIFFERS SIGNIFICANTLY (I.E. BY MORE THAN ONE CATEGORY) FROM THE PREVIOUS WAVE, ASK THE FOLLOWING QUESTION.]
The last time your enterprise was interviewed, it had <*STATE ANSWER FROM PREVIOUS WAVE*> employees. Can you confirm that the number has <*increased/decreased*> to <*STATE ANSWER FROM CURRENT WAVE*>? [READ IF NECESSARY: If not, what is the correct number?]

D3. What is the main activity of your enterprise?

[ONLY ONE ANSWER IS POSSIBLE]

- construction 2
- industry [READ IF NECESSARY: it includes manufacturing, mining and electricity, gas and water supply] 12
- wholesale or retail trade 4
- transport 5
- agriculture [STOP INTERVIEW → INTERVIEW NOT VALID] 8
- public administration [STOP INTERVIEW → INTERVIEW NOT VALID] 9
- financial services [STOP INTERVIEW → INTERVIEW NOT VALID] 10

- other services to businesses or persons 13
- [READ IF NECESSARY: If none of these, please specify.]
  [IF RECODING IS NOT POSSIBLE, STOP INTERVIEW → INTERVIEW NOT VALID] 11
- [DK/NA] [STOP INTERVIEW → INTERVIEW NOT VALID] 99

D3_C. PANEL MEMBERS: [IF SECTOR DIFFERS FROM THE PREVIOUS WAVE, ASK THE FOLLOWING QUESTION.]
The last time your enterprise was interviewed, it was active in <*STATE ANSWER FROM PREVIOUS WAVE*>. Can you confirm that it is involved in <*STATE ANSWER FROM CURRENT WAVE*>? [READ IF NECESSARY: If not, what is the correct category?]

D6. NEW RESPONDENTS: Who owns the largest stake in your enterprise?
D6. PANEL MEMBERS: Can you confirm that the largest stake in your enterprise is still owned by <STATE ANSWER FROM PREVIOUS WAVE>? [READ IF NECESSARY: If not, what is the correct category?]

[ONLY ONE ANSWER IS POSSIBLE. IF RESPONDENT CLASSIFIES THE ENTERPRISE IN ONE OF THE FIRST CATEGORIES, THERE IS NO NEED TO READ ALL THE CATEGORIES]

[READ IF NECESSARY (NOTE ON THE REFERENCE TO THE LIMITED LIABILITY COMPANY): A limited liability company is a legal form of an enterprise that provides protection against personal liability to its owners. The owners can be natural persons or other enterprises. To which category would you classify the owner with the largest stake in your enterprise? READ THE CATEGORIES]

- one owner only, that is yourself or another natural person.....5
- family or entrepreneurs [READ IF NECESSARY: more than one owner].....2
- other enterprises or business associates.....3
- public shareholders, as your enterprise is listed on the stock market 1
- venture capital enterprises or business angels [READ IF NECESSARY: individual investors providing capital or know-how to young innovative enterprises].....4
- other.....7
- [DK/NA].....9

D4. What was the annual turnover of your enterprise in 2014?

[ONLY ONE ANSWER IS POSSIBLE]
[For non-euro area countries, the amounts in euro will be converted to national currency.]

- up to €500,000 5
- more than €500,000 and up to €1 million..... 6
- more than €1 million and up to €2 million 7
- more than €2 million and up to €10 million..... 2
- more than €10 million and up to €50 million..... 3
- more than €50 million..... 4
- [DK/NA]..... 9

D4_C. PANEL MEMBERS: [IF THE NEW CATEGORY DIFFERS SIGNIFICANTLY (I.E. BY MORE THAN ONE CATEGORY) FROM THE PREVIOUS WAVE, ASK THE FOLLOWING QUESTION.]
The last time your enterprise was interviewed, the turnover was <*STATE ANSWER FROM PREVIOUS WAVE* >. Can you confirm that it is now <*STATE ANSWER FROM CURRENT WAVE*>? [READ IF NECESSARY: If not, what is the correct category?]

D7. What percentage of your company's total turnover in 2014 is accounted for by exports of goods and services? [READ IF NECESSARY: Exports comprise sales of goods or the provision of services to non-residents, including to foreign tourists visiting the relevant country.]

NUMERICAL ANSWER IN PERCENTAGES [0-100] [DK/NA: -99]

D7_rec. [IF (NA/DK) → ASK WHETHER ONE OF THE FOLLOWING CATEGORIES WOULD APPLY – ONLY ONE ANSWER IS POSSIBLE]
Which of the following categories apply?

- 0% – my enterprise did not export any goods and services last year 1
- less than 25% 2
- between 25% and 50% 3
- over 50% 4
- [DK] 9

D7_C. PANEL MEMBERS: [IF THE NEW CATEGORY DIFFERS SIGNIFICANTLY (I.E. BY MORE THAN ONE CATEGORY) FROM THE PREVIOUS WAVE, ASK THE FOLLOWING QUESTION.]
The last time your enterprise was interviewed, the share of total turnover accounted for by exports was <*STATE ANSWER FROM PREVIOUS WAVE*>. Can you confirm that it is now <*STATE ANSWER FROM CURRENT WAVE*>? [READ IF NECESSARY: If not, what is the correct number?]

D5. NEW RESPONDENTS: In which year was your enterprise first registered? [READ IF NECESSARY: In the case of a past acquisition, please refer to the year when the acquiring enterprise was registered or, in the case of a merger, to the largest enterprise involved (in terms of employees)].
D5. PANEL MEMBERS: Can you please confirm that your enterprise was registered in <*STATE ANSWER FROM PREVIOUS WAVE*>? [READ IF NECESSARY: If not, what is the correct year?]

NUMERICAL ANSWER [1700-2015] <*FOUR DIGITS, LESS OR EQUAL THAN YEAR OF SURVEY*>
[DK/NA]

[THE AGE OF THE ENTERPRISE IS CALCULATED AS 2015 MINUS THE YEAR OF REGISTRATION.]

D5_rec. [IF NA/DK → ASK WHETHER ONE OF THE FOLLOWING CATEGORIES WOULD APPLY – ONLY ONE ANSWER IS POSSIBLE]
Approximately, how old is your enterprise?

- 10 years or more 1
- 5 years or more, but less than 10 years 2
- 2 years or more, but less than 5 years 3
- less than 2 years 4
- [DK/NA] 9

SECTION 2: GENERAL INFORMATION ON THE TYPE AND SITUATION OF THE ENTERPRISE

We will now turn to your enterprise's current situation. When asked about the changes experienced by your enterprise over the past six months, please report just the changes that have occurred between October 2014 and now.

[FILTER: ALL ENTERPRISES]

Q0b. How important have the following problems been for your enterprise in the past six months? Please answer on a scale of 1-10, where 10 means the problem is extremely important and 1 means it is not at all important.

[ONE ANSWER PER LINE. DK/NA (CODE 99) OPTION PERMITTED]

1. Finding customers .....
2. Competition .....
3. Access to finance [READ IF NECESSARY: Financing of your business – bank loans, trade credit, equity, debt securities, other external financing] .....
4. Costs of production or labour [READ IF NECESSARY: If your company does not have production costs, please refer only to labour costs. Labour costs include wages, employee benefits and payroll taxes paid by an employer.] .....
5. Availability of skilled staff or experienced managers .....
6. Regulation, for example European and national laws, industrial regulations .....

   [CATEGORY 'OTHER' FOR ALL COUNTRIES, EXCEPT 10% OF THE SAMPLE IN GERMANY, SPAIN, FRANCE, GREECE, ITALY AND IRELAND (SELECTED RANDOMLY)]
7. Other problems not specified above [READ IF NECESSARY: for example cash flow, problem with finding suppliers.].....

   [CATEGORY 'OTHER, PLEASE SPECIFY' FOR 10% OF THE SAMPLE IN GERMANY, SPAIN, FRANCE, GREECE, ITALY AND IRELAND (SELECTED RANDOMLY)]
7. Other, please specify [WRITE DOWN THE VERBATIM ANSWER]

Q2. Have the following company indicators decreased, remained unchanged or increased over the past six months?
[ONLY ONE ANSWER PER LINE]

- Increased 1
- Remained unchanged 2
- Decreased 3
- [NOT APPLICABLE, ENTERPRISE HAS NO DEBT] 7
- [DK/NA] 9

[AS REGARDS ITEM (d) and (j), IF THE COMPANY HAS NO DEBT, CODE 7 (NOT APPLICABLE) SHOULD BE USED.]

a) Turnover 1 2 3 9
b) Labour costs (including social contributions) 1 2 3 9
c) Other costs (materials, energy, other) 1 2 3 9
d) Interest expenses [READ IF NECESSARY: what your company pays in interest for its debt] 1 2 3 7 9
e) Profit [READ IF NECESSARY: net income after taxes] 1 2 3 9

g) Fixed investment [READ IF NECESSARY: investment in property, plant, machinery or equipment] 1 2 3 9

h) Inventories and other working capital [*READ IF NECESSARY: Inventories are the goods and materials that a business holds for the ultimate purpose of resale. *READ IF NECESSARY: Working capital is the difference between current assets, such as inventories and invoices, and current liabilities, that is, debt or other obligations coming due within a year.] 1 2 3 9

i) Number of employees [READ IF NECESSARY (IF RESPONDENTS GIVES THE NUMBER): Please indicate if it increased or decreased in the past six months] 1 2 3 9

j) Debt compared to assets [READ IF NECESSARY: that is the ratio of all kinds of debt to total assets] 1 2 3 7 9

SECTION 3: FINANCING OF THE ENTERPRISE

We will now turn to the financing of your enterprise.

Q4. Are the following sources of financing relevant to your enterprise, that is, have you used them in the past or considered using them in the future? Please provide a separate answer in each case.

[ONE ANSWER PER LINE IS POSSIBLE (CODE 3, 7 OR 9)]

- Yes, this source is relevant to my enterprise [READ FOR THE FIRST TWO ITEMS, AFTERWARDS IF NECESSARY: that is, I have used it in the past or I considered using it in the future) 3
- No, this source is not relevant to my enterprise 7
- [DK] 9

[FOR EACH FINANCING SOURCE, IF THE ANSWER IS "YES" (CODE 3), ASK THE RELEVANT FOLLOW-UP QUESTION – ONE ANSWER PER LINE IS POSSIBLE (CODE 1, 2 OR 99)]

- Yes 1
- No 2
- [DK] 99

c) Credit line, bank overdraft or credit cards overdraft. [*READ IF NECESSARY: A credit line is a pre-arranged loan that can be used, in full or in part, at discretion and with limited advance warning. *READ IF NECESSARY: The difference between a bank loan and a credit line is that in the case of a bank loan, the precise amount of loan and the dates of repayments are usually fixed, while in the case of a credit line, the borrower can draw only part of the money at discretion up to an agreed maximum balance, and interest is charged only on money actually withdrawn. *READ IF NECESSARY: A bank overdraft is the negative balance on a bank account with or without specific penalties. *READ IF NECESSARY: A credit card overdraft is a negative balance on a credit card.] 3 7 9

IF "YES" (CODE 3) → Have you drawn on such types of credit in the past six months? 1 2 99

b) Grants or subsidised bank loans [READ IF NECESSARY: involving, for example, support from public sources in the form of guarantees or reduced interest rate loans.].....3 7 9

IF "YES" (CODE 3) → Have you obtained new financing of this type in the past six months?.....1 2 99

d) Bank loan (excluding subsidised bank loans, overdrafts and credit lines) [*READ IF NECESSARY: both short and long-term.
*READ IF NECESSARY: The difference between a bank loan and a credit line is that in the case of a bank loan, the precise amount of loan and the dates of repayments are usually fixed, while in the case of a credit line, the borrower can draw only part of the money at discretion up to an agreed maximum balance, and interest is charged only on money actually withdrawn.] 3 7 9

IF "YES" (CODE 3) → Have you taken out a new loan or renewed such a loan in the past six months?.....1 2 99

e) Trade credit [READ IF NECESSARY: that means paying your suppliers at the later agreed date, usually 30, 60 or 90 days after the delivery of the purchased goods or services].....3 7 9

IF "YES" (CODE 3) → Have you obtained trade credit from your business partners in the past six months?.....1 2 99

f) Other loan, for example from family and friends, a related enterprise or shareholders, excluding trade credit.....3 7 9

IF "YES" (CODE 3) → Have you taken out or renewed such a loan in the past six months?.....1 2 99

m) Leasing or hire-purchase [READ IF NECESSARY: obtaining the use of a fixed asset (for example, cars or machinery) in exchange for regular payments, but without the immediate ownership of the asset].....3 7 9

IF "YES" (CODE 3) → Have you obtained new financing of this type in the past six months?.....1 2 99

h) Debt securities issued [READ IF NECESSARY: short-term commercial paper or longer-term corporate bonds issued by your enterprise] 3 7 9

IF "YES" (CODE 3) → Have you issued any debt securities in the past six months? 1 2 99

j) Equity capital [*READ IF NECESSARY: Equity capital refers to raising capital through the sale of shares in your enterprise. It is usually associated with the financing of companies listed on an exchange via public offerings. It can also involve a private sale, in which the transaction between investors and the enterprise takes place directly.
*READ IF NECESSARY: Equity capital includes quoted and unquoted shares or other forms of equity provided by the owners themselves or by external investors, including venture capital or business angels.
*READ IF NECESSARY: Venture capital enterprises or business angels are individual investors providing capital or know-how to young innovative enterprises.] 3 7 9

IF "YES" (CODE 3) → Have you issued equity in the past six months?.....1 2 99

r) Factoring [READ IF NECESSARY: selling your invoices to a factoring company; this company gets your debt and has to collect it; it will make a profit by paying you less cash than the face value of the invoice] 3 7 9

IF "YES" (CODE 3) → Have you used factoring in the past six months? 1 2 99

a) Retained earnings or sale of assets [READ IF NECESSARY: internal funds like cash or cash equivalent, resulting for instance from savings, retained earnings or sale of assets] 3 7 9

IF "YES" (CODE 3) → Have you retained earnings or sold assets in the past six months? 1 2 99

p) Other sources of financing, for example subordinated debt instruments, participating loans, peer-to-peer lending, crowdfunding [*READ IF NECESSARY: Subordinated debt is repayable only after other debts have been satisfied.
*READ IF NECESSARY: A participating loan gives the lender the right to convert the loan into an ownership or equity interest in the company under specified clauses and conditions.
*READ IF NECESSARY: Peer-to-peer lending consists of lending money to an unrelated individual or enterprise without a traditional financial intermediary, usually via dedicated online lending portals.
*READ IF NECESSARY: Crowdfunding involves raising monetary contributions from a large number of people, typically via the internet] 3 7 9

IF "YES" (CODE 3) → Have you obtained such sources of financing in the past six months? 1 2 99

[FILTER: IF ITEM Q4.d) (BANK LOANS) IS "NOT RELEVANT" (CODE 7)]
Q32. You mentioned that bank loans are not relevant for your enterprise. What is the main reason for this?
[ONLY ONE ANSWER IS POSSIBLE]

- Insufficient collateral or guarantee 1
- Interest rates or price too high 2
- Reduced control over the enterprise 3
- Too much paperwork is involved 6
- No bank loans are available 4
- I do not need this type of financing 8
- Other 5
- [DK] 9

[FILTER: FOR EACH Q4 ITEMS THAT IS "RELEVANT" (CODE 1, 2, 3, 99), NAMELY Q4.c), Q4.d), Q4.b), Q4.e), Q4.h) AND Q4.j), FILL THE RELEVANT ITEM IN Q5]

Q5. For each of the following types of external financing, please indicate if your needs increased, remained unchanged or decreased over the past six months.
[ONE ANSWER PER LINE IS POSSIBLE]

- Increased 1
- Remained unchanged 2
- Decreased 3
- [INSTRUMENT NOT APPLICABLE TO MY ENTERPRISE] 7
- [DK] 9

[FILTER: IF Q4.c) FEATURES CODE 1, 2 OR 99]
f) Credit line, bank overdraft or credit cards overdraft 1 2 3 7 9

[FILTER: IF Q4.d) FEATURES CODE 3 OR Q4.b) FEATURES CODE 1, 2 OR 99]
a) Bank loans (excluding overdraft and credit lines) 1 2 3 7 9

[FILTER: IF Q4.e) FEATURES CODE 3]
b) Trade credit 1 2 3 7 9

[FILTER: IF Q4.j) FEATURES CODE 1, 2 OR 99]
c) Equity capital [READ IF NECESSARY: including venture capital or business angels] 1 2 3 7 9

[FILTER: IF Q4.h) FEATURES CODE 1, 2 OR 99]
d) Debt securities issued [READ IF NECESSARY: short-term commercial paper or longer-term corporate bonds issued by your enterprise] 1 2 3 7 9

[FILTER: IF Q4.m) FEATURES CODE 1, 2 OR 99]

g) Leasing or hire-purchase [READ IF NECESSARY: obtaining the use of a fixed asset, for example, cars or machinery, in exchange for regular payments, but without the immediate ownership of the asset] 1 2 3 7 9

[FILTER: IF Q4.f) FEATURES CODE 1, 2 OR 99]

h) Other loan, for example from family and friends, a related enterprise or shareholders, excluding trade credit 1 2 3 7 9

[FILTER: FOR EACH Q4 ITEM THAT IS "RELEVANT" (CODE 1, 2, 3, 99), NAMELY Q4.c), Q4.d), Q4.b) AND Q4.e), FILL THE RELEVANT ITEM IN Q7A]

Q7A. Have you applied for the following types of financing in the past six months?
[ONE ANSWER PER LINE IS POSSIBLE]

- Applied 1
- Did not apply because of possible rejection 2
- Did not apply because of sufficient internal funds 3
- Did not apply for other reasons 4
- [DK/NA] 9

[FILTER: IF Q4.c) FEATURES CODE 1, 2 OR 99]
d) Credit line, bank overdraft or credit cards overdraft 1 2 3 4 9

[FILTER: IF Q4.d) OR Q4.b) FEATURE CODE 1, 2, 3 OR 99]
a) Bank loan (excluding overdraft and credit lines) 1 2 3 4 9

[FILTER: IF Q4.e) FEATURES CODE 3]
b) Trade credit [READ IF NECESSARY: It covers not only an explicit request for trade credit to the business partners, but also if you have received a trade credit within a standard business practice] 1 2 3 4 9

[FILTER: IF AT LEAST ONE OF THE Q4 ITEMS Q4.f), Q4.h), Q4.j), Q4.m), Q4.r) OR Q4.p) IS "RELEVANT" (CODE 1, 2, 99)]

c) Other external financing [READ IF NECESSARY: for example, loans from a related company, shareholders or family and friends, leasing, factoring, grants, subordinated debt instruments, participating loans, peer-to-peer lending, crowdfunding, and issuance of equity and debt securities]..... 1 2 3 4 9

[FILTER: FOR EACH Q7A ITEM THAT IS "APPLIED" (CODE 1), FILL THE RELEVANT ITEM IN Q7B]

Q7B. If you applied and tried to negotiate for this type of financing over the past six months, what was the outcome? Please provide a separate answer in each case.
[ONLY ONE ANSWER PER LINE IS POSSIBLE]

- Received everything.....1
- Received 75% and above [DO NOT READ: received most of it] 5
- Received below 75% [DO NOT READ: only received a limited part of it].....6
- Refused because the cost was too high.....3
- Was rejected 4
- Application is still pending.....8
- [DK].....9

[FILTER: IF Q7A.d) FEATURES CODE 1]
d) Credit line, bank overdraft or credit cards overdraft.....1 3 4 5 6 8 9

[FILTER: IF Q7A.a) FEATURES CODE 1]
a) Bank loan (excluding overdraft and credit lines).....1 3 4 5 6 8 9

[FILTER: IF Q7A.b) FEATURES CODE 1]
b) Trade credit 1 3 4 5 6 8 9

[FILTER: IF Q7A.c) FEATURES CODE 1]
c) Other external financing [READ IF NECESSARY: for example, loans from a related company, shareholders or family and friends, leasing, factoring, grants, subordinated debt instruments, participating loans, peer-to-peer lending, crowdfunding, and issuance of equity and debt securities].....1 3 4 5 6 8 9

[FILTER: IF Q7B.a) FEATURES CODE 1, 3, 4, 5, 6 OR 8]

Q8A. What is the size of the last bank loan that your enterprise…

[IF Q7B. a) FEATURES CODE 1, 5 or 6]
…obtained or renegotiated in the past six months?

[IF Q7B. a) FEATURES CODE 3, 4 or 8]
…attempted to obtain in the past six months?

[ONLY ONE ANSWER IS POSSIBLE]
[For non-euro area countries, the amounts in euro will be converted into national currency.]

- up to €25,000 1
- more than €25,000 and up to €100,000.....2
- more than €100,000 and up to €250,000.....5
- more than €250,000 and up to €1 million.....6
- over €1 million.....4
- [DK/NA].....9

[FILTER: IF Q7A.a) FEATURES CODE 1]

Q41A. Referring only to the most recent loan, did the financing require collateral?

[ONLY ONE ANSWER IS POSSIBLE]

- Yes.....1
- No.....2
- [DK/NA].....9

[FILTER: IF Q41A FEATURES CODE 1]

Q41B. What type of collateral was required?

- Yes 1
- No 2
- [DK/NA] 9

1) Land or buildings 1 2 9
2) Machinery or equipment 1 2 9
3) Invoices [READ IF NECESSARY: that is accounts receivable in accounting terms] and inventories 1 2 9
4) Personal assets of owner [READ IF NECESSARY: for example, house] 1 2 9
5) Other forms of collateral 1 2 9

[FILTER: IF Q41A FEATURES CODE 1]

Q41C. What was the approximate value of the collateral required as a percentage of the size of the loan?

NUMERICAL ANSWER IN PERCENTAGES [0-999] [DK/NA: -99]

Q41C_rec. [IF (NA/DK) → ASK WHETHER ONE OF THE FOLLOWING CATEGORIES WOULD APPLY – ONLY ONE ANSWER IS POSSIBLE]

Which of the following categories applies?

- up to 75%.....1
- more than 75% and up to 100% 2
- more than 100% and up to 125% 3
- more than 125% and up to 150% 4
- over 150%.....5
- [DK] 9

[FILTER: IF Q7B.d) FEATURES CODE 1, 3, 5 OR 6]

Q8B. What interest rate was charged for the credit line or bank overdraft for which you applied?

NUMERICAL ANSWER IN PERCENTAGES [0-100] [DK/NA: -99]

[FILTER: ALL ENTERPRISES]

Q6A. For what purpose was financing used by your enterprise during the past six months? [READ IF NECESSARY: Financing could have been obtained both from the external sources and from funds generated by your enterprise.]

- Yes..... 1
- No 2
- [DK/NA (NOT APPLICABLE TO MY ENTERPRISE - I HAVE NOT USED ANY FINANCING)] 99

1) Fixed investment [READ IF NECESSARY: investment in property, plant, machinery or equipment] 1 2 99
2) Inventory and other working capital 1 2 99
3) Hiring and training of employees 1 2 99
4) Developing and launching of new products or services 1 2 99
5) Refinancing or paying off obligations 1 2 99
6) Other 1 2 99

[FILTER: ALL ENTERPRISES]

SECTION 4: AVAILABILITY OF FINANCE AND MARKET CONDITIONS

In this part of the survey, we would like to ask about your enterprise's experiences and views on the availability of finance and market conditions.

Q11. For each of the following factors, would you say that they have improved, remained unchanged or deteriorated over the past six months?
[ONE ANSWER PER LINE]

- Improved 1
- Remained unchanged 2
- Deteriorated 3
- [NOT APPLICABLE TO MY ENTERPRISE - ONLY FOR b), e), f), g), h)] 7
- [DK] 9

a) General economic outlook, insofar as it affects the availability of external financing 1 2 3 9
b) Access to public financial support, including guarantees 1 2 3 7 9
c) Your enterprise-specific outlook with respect to your sales and profitability or business plan [READ IF NECESSARY: insofar as it affects the availability of external financing for you] 1 2 3 9
d) Your enterprise's own capital [READ IF NECESSARY: capital provided by the owners or shareholders of the enterprise] 1 2 3 9
e) Your enterprise's credit history [READ IF NECESSARY: in other words, your credit worthiness, that is your track record of repaying past debts] 1 2 3 7 9

[FILTER: IF THE ITEM Q4.c) (CREDIT LINE, BANK OVERDRAFT, CREDIT CARD OVERDRAFT), Q4.d) (BANK LOAN) OR Q4.b) (SUBSIDISED BANK LOAN) IS "RELEVANT" (CODE 1, 2, 3, 99)]
[CODE 7 IS NOT TO BE USED FOR ENTERPRISES HAVING "APPLIED" (CODE 1) IN Q7A.d), OR Q7A.a)]

f) Willingness of banks to provide credit to your enterprise [READ IF NECESSARY: lender's attitude] 1 2 3 7 9

[FILTER: IF THE ITEM Q4.e) (TRADE CREDIT) IS "RELEVANT" (CODE 3)]
[CODE 7 IS NOT TO BE USED FOR ENTERPRISES HAVING "APPLIED" (CODE 1) IN Q7A.b)]

g) Willingness of business partners to provide trade credit [READ IF NECESSARY: business partners' attitude] 1 2 3 7 9

[FILTER: IF ONE OF THE Q4 ITEMS Q4.f) (OTHER LOAN), Q4.h) (DEBT SECURITIES), Q4.j) (EQUITY CAPITAL) OR Q4.p) (OTHER SOURCES OF FINANCING) IS "RELEVANT" (CODE 1, 2, 99)]

h) Willingness of investors to invest in your enterprise [READ IF NECESSARY: investors' attitudes towards, for example, investing in equity or debt securities issued by your enterprise] 1 2 3 7 9

[FILTER: FOR EACH OF THE Q4 ITEMS THAT ARE "RELEVANT" (CODE 1, 2, 3, 99), NAMELY Q4.c), Q4.d), Q4.b), Q4.e), Q4.h) AND Q4.j), FILL THE RELEVANT ITEM IN Q9]

Q9. For each of the following types of financing, would you say that their availability has improved, remained unchanged or deteriorated <u>for your enterprise</u> over the past six months?
[ONE ANSWER PER LINE]

- Improved 1
- Remained unchanged 2
- Deteriorated 3
- [NOT APPLICABLE TO MY ENTERPRISE] 7
- [DK] 9

[FILTER: IF Q4.c) FEATURES CODE 1, 2 OR 99]
[CODE 7 IS NOT TO BE USED FOR ENTERPRISES HAVING "APPLIED" (CODE 1) IN Q7A.d)]

f) Credit line, bank overdraft or credit cards overdraft 1 2 3 7 9

[FILTER: IF Q4.d) FEATURES CODE 3 OR Q4.b) FEATURES CODE 1, 2 OR 99]
[CODE 7 IS NOT TO BE USED FOR ENTERPRISES HAVING "APPLIED" (CODE 1) IN Q7A.a)]

a) Bank loans (excluding overdraft and credit lines) 1 2 3 7 9

[FILTER: IF Q4.e) FEATURES CODE 3]
[CODE 7 IS NOT TO BE USED FOR ENTERPRISES HAVING "APPLIED" (CODE 1) IN Q7A.b)]

b) Trade credit 1 2 3 7 9

[FILTER: IF Q4.j) FEATURES CODE 1, 2 OR 99]
c) Equity capital [READ IF NECESSARY: including venture capital or business angels] 1 2 3 7 9

[FILTER: IF Q4.h) FEATURES CODE 1, 2 OR 99]

d) Debt securities issued [READ IF NECESSARY: short-term commercial paper or longer-term corporate bonds issued by your enterprise] 1 2 3 7 9

[FILTER: IF Q4.m) FEATURES CODE 1, 2 OR 99]

g) Leasing or hire-purchase [READ IF NECESSARY: obtaining the use of a fixed asset (for example, cars or machinery) in exchange for regular payments, but without the immediate ownership of the asset] 1 2 3 7 9

[FILTER: IF Q4.f) FEATURES CODE 1, 2 OR 99]

h) Other loan, for example from family and friends, a related enterprise or shareholders, excluding trade credit 1 2 3 7 9

[FILTER: Q7A.A) OR Q7A.D) IS "APPLIED" (CODE 1) (BANK LOANS, AND CREDIT LINES, BANK OVERDRAFT AND CREDIT CARD OVERDRAFTS)]

Q10. We will turn now to the terms and conditions of <u>bank financing</u>, such as bank loans, overdrafts and credit lines. Please indicate whether the following items increased, remained unchanged or decreased in the past six months.
[ONE ANSWER PER LINE]

- Was increased by the bank 1
- Remained unchanged 2
- Was decreased by the bank 3
- [DK/NA] 9

Price terms and conditions:

a) Level of interest rates 1 2 3 9
b) Level of the cost of financing other than interest rates, such as charges, fees, commissions 1 2 3 9

Non-price terms and conditions:

c) Available size of loan or credit line 1 2 3 9
d) Available maturity of the loan 1 2 3 9
e) Collateral requirements [READ IF NECESSARY: the security given by the borrower to the lender as a pledge for the repayment of the loan] 1 2 3 9
f) Other, for example, required guarantees, information requirements, procedures, time required for loan approval, loan covenants [READ IF NECESSARY: an agreement or stipulation laid down in loan contracts under which the borrower pledges either to take certain action or to refrain from taking certain action] 1 2 3 9

[FILTER: FOR EACH Q4 ITEM THAT IS "RELEVANT" (CODE 1, 2, 3, 99), NAMELY Q4.c), Q4.d), Q4.e), Q4.h), Q4.j) and Q4.a), FILL THE RELEVANT ITEM IN Q23]

Q23. Looking ahead, for each of the following types of financing available to your enterprise, please indicate whether you think their availability will improve, deteriorate or remain unchanged over the next six months.
[ONE ANSWER PER LINE]

- Will improve 1
- Will remain unchanged 2
- Will deteriorate 3
- [INSTRUMENT NOT APPLICABLE TO MY ENTERPRISE] 7
- [DK] 9

[FILTER: IF Q4.c) FEATURES CODE 1, 2 OR 99]
[CODE 7 IS NOT TO BE USED FOR ENTERPRISES HAVING "APPLIED" (CODE 1) IN Q7A.d)]

g) Credit line, bank overdraft or credit cards overdraft 1 2 3 7 9

[FILTER: IF Q4.d) OR Q4.b) FEATURES CODE 1, 2, 3 OR 99]
[CODE 7 IS NOT TO BE USED FOR ENTERPRISES HAVING "APPLIED" (CODE 1) IN Q7A.a)]

b) Bank loans (excluding overdraft and credit lines) 1 2 3 7 9

[FILTER: IF Q4.e) FEATURES CODE 3]
[CODE 7 IS NOT TO BE USED FOR ENTERPRISES HAVING “APPLIED” (CODE 1) IN Q7A.b)]

d) Trade credit 1 2 3 7 9

[FILTER: IF Q4.j) FEATURES CODE 1, 2 OR 99]

c) Equity capital [READ IF NECESSARY: including venture capital or business angels] 1 2 3 7 9

[FILTER: IF Q4.h) FEATURES CODE 1, 2 OR 99]

e) Debt securities issued [READ IF NECESSARY: short-term commercial paper or longer-term corporate bonds issued by your enterprise] 1 2 3 7 9

[FILTER: IF Q4.a) FEATURES CODE 1, 2 OR 99]

a) Retained earnings or sale of assets [READ IF NECESSARY: internal funds] 1 2 3 7 9

[FILTER: IF Q4.m) FEATURES CODE 1, 2 OR 99]

i) Leasing or hire-purchase [READ IF NECESSARY: obtaining the use of a fixed asset (for example, cars or machinery) in exchange for regular payments, but without the immediate ownership of the asset] 1 2 3 7 9

[FILTER: IF Q4.f) FEATURES CODE 1, 2 OR 99]

j) Other loan, for example from family and friends, a related enterprise or shareholders, excluding trade credit 1 2 3 7 9

Chapter 5: Conclusion

This thesis first examines the role of banks in the transmission mechanism of monetary policy, by concentrating on the eight new European Member States that joined the European Union (EU) in 2004 following the agreement by the Treaty of Accession 2003 (Chapter 2). These transition economies have undergone substantial and extensive economic changes during the past decades, which enhanced their integration into the EU. Specifically, they have transitioned from a centrally-planned to a free-market structured economy. Yet, these States only recently began joining the Economic and Monetary Union (EMU), therefore a better grasp of the mechanism of monetary policy transmission in these countries would be appropriate and very beneficial for policy makers.

This topic is a novel contribution to the banking literature that investigates the functioning of the Bank Lending Channel (BLC) of monetary policy transmission with significant policy implications. Here a large panel of disaggregated data is used for individual banks and fixed effects specification.

Surprisingly, the growth of bank lending in reaction to monetary policy stance derived from money market rates in the short term is not significant apart from the Czech Republic and Slovenia. As a result, the theory of a direct relationship via the money lending channel is unproven; however, our empirical findings suggest a credible hypothesis to substantiate a direct relationship via the BLC of monetary policy within most of the Central and Eastern European (CEE) countries, while the strength of this channel differs between countries. The existence of the BLC is shown via capitalisation and seems be a significant, contributing bank-specific characteristic for investigating banks' response to monetary policy changes in Baltic States, the Czech Republic, Poland, and Slovakia. The coefficient on bank size is measured as statistically insignificant for the CEE countries. As a result, the matter of informational asymmetry is not crucial; this conclusion is supported by the

empirical literature that investigated the BLC, particularly regarding banks in Western Europe.

Although no data to corroborate the existence of the BLC via bank liquidity has been identified (apart from in Slovakia), bank risk seems to be an important differentiating factor in the reaction of banks to changes in the monetary policy stance in the Czech Republic, Poland, Slovenia and Slovakia over the analysed period. Furthermore, the interaction terms between the Lerner index and monetary policy, and its effect on the supply of loan, suggest negative and statistically significant correlation between the Czech Republic, Baltic States, Poland and Slovenia. A negative coefficient indicates that monetary policy is more effective when implemented in a background of imperfect markets. Particularly through contracting the monetary policy indicator, the monetary authorities will probably effectively reduce the supply of bank loans within a banking market with reduced competition.

However, the BLC of monetary policy is determined to have weakened from 2008-2011, a deduction based on the observation that bank characteristics were ultimately either not significant or had unexpectedly negative values; these conclusions may be considered as an additional negation of the proposed role of these characteristics in sustaining bank lending activity and growth during the Global Financial Crisis (GFC). This result is supposed by the recent empirical studies on the BLC during the GFC period, in which they show that bank behaviour shifted. Specifically, banks that are struggling to submit to a restructuring process and function in a dynamic economic background react dissimilarly to monetary shocks via the BLC of MTM. Accordingly, we find that the effectiveness of monetary policy has been declined during GFC due to various factors, such as bank aversion to increase lending activity and volume regardless of the changes in the monetary policy stance. The crucial question of whether these variations in the

MTM will remain in the next few years or fade while the GFC diminishes. Results documented in the thesis are in keeping with a situation in which these modifications can only be considered transient and tend to develop with time.

Some policy implications may be garnered from the findings presented here. Firstly, we find that bank capital and liquidity potentially exert positive and significant influences on bank lending growth during the entire study spanning the 2004-2013 period. Consequently, it would be prudent that banks follow the banking regulations formed by the Basel Committee. Given that contemporary research indicates that improving core capital facilitates the transmission of monetary policy. Additionally, the shadow banking system should be intensely scrutinised due to the presence of possibly hazardous elements native to this system, strengthening the notion of having regulation procedures that are a good fit with its complementary financial institution. This thesis recommends better, more detailed statistical reporting on the entire banking system. Measurement by tier-1 capital ratio would be especially advantageous because it would allow later studies to conduct a thorough assessment of the monetary policy transmission mechanism because it includes additional parameters. Thirdly, unlike many prior empirical studies on the BLC here it is not crucial to employ the Arellano and Bond methodology to estimate a model of bank loan growth in the CEE countries since the lagged dependent variable is under no circumstances significant; this observation is the basis of a convincing argument against the inclusion of the variable as a regressor. Accordingly, the empirical model is tested via the fixed effect model, the favoured specification. Therefore, it may be vital that researchers document and proof whether the lagged dependent variable is significant under the Arellano and Bond estimation methodology. Therefore, future studies should address this topic, since false suppositions concerning dynamics represented in the evidence may negatively affect inference.

Chapter 3 investigates the impact of a protracted period of low monetary policy rates on loosening of banks' credit standards concerning enterprises, households and consumer loans. Utilising a balanced panel dataset of 9 countries that have taken part ever since the initiation of the Euro area Bank Lending Survey (BLS), we focus on three distinct time frames of pre- (2002Q4-2008Q3), mid- (2008Q 4-2010Q4) and post- (2011Q1-2014:Q4) financial crisis. The Generalized Method of Moments (GMM) estimator is employed for the majority of our regressions, an approach recommended by Arellano and Bond (1991). In this case the euro area represents a novel institutional environment with a common monetary policy. Moreover, inside this region, capital to the corporate segment is mainly supplied by banks, which is equal to approximately around 75–80 percent.

From the onset of the GFC, outspoken academics have contended that suppressing monetary policy rates may encourage banks to engage in credit and liquidity risk owing to banks' moral hazard issues. This could boost the chances of the financial crisis coming from accretion of bank risk in the system. We find robust evidence that low-short term interest rates prior to the crisis caused a disproportionate softening of credit standards concerning enterprises, household and consumer loans.

Despite the scope of expansionary monetary policy chiefly recognised in the post-crisis period, negative Taylor-rule residuals just resulted in loosening of total lending standards for enterprises loans whereas demand for loans was basically somewhat unchanged. Moreover, we observe that 10-year government bond rates are mostly not determined statistically significant, highlighting that lending standards are not influenced through long-term national interest rates. In particular, results suggest that higher rates of GDP growth are connected to the softening of total lending standards, particularly in the pre-crisis sample, supporting the claim that banks' credit standards are '*pro-cyclical*'. Particularly important to recognise here are the findings which occurred before the onset

of the GFC; these results show that banks surprisingly relaxed margins for loans to borrowers that were viewed riskier, in an environment of low monetary rates in stressed and non-stressed countries of the sub-sample investigated. However, within periphery countries of the Eurozone, the data indicates that excessive risk-taking in bank lending behaviour occurred, particularly through periods of low monetary policy rates both pre- and post-crisis. Such recklessness should be targeted and systematically corrected by policy makers in the formulation of future policies by the European Central Bank (ECB). The implementation of the 3 years Long-Term Refinancing Operations (LTROs) by the ECB negatively affected the development of banks' credit tightening, which is reassuring and important to mitigate the probable, severe consequences of the latest financial crisis. Nevertheless, the benefits of this scheme have yet to be observed in the euro area real economy with a simultaneous rise in net demand.

We encounter a data limitation for the BLS data throughout the time frame being evaluated. Consequently, we could not take advantage of micro-data reaction of individual banks from all the nations participating in the survey, with identical guidelines related to micro-data on loans quantities by banks in all nations. Providing that such access is granted; future research may simply encapsulate a more detailed analysis of the role of supply and demand factors in lending to enterprises.

Chapter 4 explores the financing structure of bank lending constrained Small and Medium Sized Enterprises (SMEs) in the eleven euro area countries and uses the ECB/EC Survey on the Access to Finance of Enterprises (SAFE) for twelve waves spanning the time frame 2009 to 2014. Our estimations of credit constraints identify the following five separate forms of constrained firms: a) credit constrained firms, b) credit rationed firms, c) credit rejected firms, d) self-rationed firms and e) discouraged firms. Moreover, a thorough investigation is presented by uncovering the impact and determinants of various financing

constraints including credit lines, bank loans, trade credit and other lending on euro area firms. Furthermore, the notion of discouraged borrowers originally structured by Kon and Storey (2003) is investigated.

SMEs have an important role in the euro area corporate sector. In light of the GFC, lending to SMEs became the number one priority to consider for policymakers worldwide, since they are commonly called the backbone of the EU economy. Our analysis shows that credit-constrained, rationed, rejected and discouraged firms have a greater tendency to utilise informal lending. An additional finding described younger SMEs as displaying a greater tendency to use informal lending; this conclusion also applies to grants or subsidised bank loans. There was no substitution connection between measures of bank lending constraints and usage of trade credit; this finding is robust in both stressed and non-stressed countries of the Eurozone. Additionally, we do not find any statistically significant results to corroborate the idea that older firms are more disposed to utilise trade credit than younger firms.

An unexpected inverse significant relationship between constrained measures and the demand for grant financing has been determined. Firms experiencing rejected credit applications are 6% less likely to utilise grant financing. Stressed Eurozone countries are less likely to utilise grant financing relative to non-stressed countries. These thought-provoking results may suggest that the contemporary provision of policy measures potentially reachable by the SMEs at the euro area level are inadequately directed at firms with challenging prospects for securing credit via traditional bank lending. Additionally, we find that that younger firms are 8% more likely to use this source of financing; however, this observation only applies for non-stressed countries.

There was no substitution connection between our wide parameters of bank lending constrained with usage of leasing, hire purchase or factoring and internal funds.

Concentrating on periphery countries of the Eurozone, we find that firms who experience rejected credit applications are on average less likely to use market financing and leasing, hire purchase or factoring, compared with Eurozone *'core'* economies.

From the data it appears that micro and younger firms have a comparatively higher tendency to have applications for bank loans and credit lines rejected; this finding corroborates the majority of prior empirical research on SMEs' access to finance. Comparable supporting data concerning firm's size and trade credit rejection are recognised; however, there is no conclusive finding to control a linkage between firm's age and our constrained indicators for trade credit and other financing.

In line with our prior expectation, the data indicates that smaller, younger firms show a greater tendency to be discouraged for bank loans. While analysing variables connected with the financial profile of firms, the findings show that firms with the prospect of deteriorating credit history and capital position show a greater tendency to be discouraged at a rate of 2% and 7%, respectively. Focusing on stressed countries of the Eurozone, there is data to suggest that that micro firms are more likely to be discouraged; however, there is no corroborating evidence for the effects of firms' ages on the level of discouragement, in contrast to the pattern seen for the main sample in addition to non-stressed countries of the euro area. From the results it can be inferred that micro firms encounter higher discouragement, which is more common when limiting the sample to frequency<=3, where 20% of firms are indeed likely to face discouragement. With respect to banking and macroeconomic indicators, of particular significance is that higher government bonds yield produce discouragement in stressed countries, suggesting that financial pressure within the banking sector has a negative effect on firms requests for external financing via banks.

Data assessed for this thesis is from 2009 onwards and not data concerning associations present during the *'normal'* economic cycle. Consequently, it was impossible to test for the presence of appreciable modifications, powered by elements linked to the GFC, regarding how firm-specific traits impact the SMEs' financing pattern.

Remarkably, most of the data sampled in the ECB/EC SAFE survey is qualitative; therefore, this current study recommends that subsequent surveys include both firm level balance sheet data and quantitative information regarding SMEs' financial condition. This change should substantially improve future research concerning the implications of government policy and its influence on the SMEs' financing structure.

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